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EDITORIAL NOTES—GAS, &c.

Glover-West Continuous Carbonization System.

By the publication of a special article in this issue of the "JOURNAL" on the construction and working of a setting of eight vertical retorts on the continuous system of operation devised by Messrs. Glover and West, an important chapter has been added to the already pregnant carbonization history of our times. There has been steady prosecution of work at St. Helens; and from it has issued a practical and successful combination, with several months' run supporting these ascribed attributes. This period of work, as well as the size of the setting—eight retorts 20 feet long, carbonizing 20 tons of coal a day, and producing about one-fifth of the gas required at the present season for St. Helens—cannot be characterized as purely experimental. It is something more than that—it is a fair working example of the system; and as such it has now settled down as an integrant of the producing plant of the works, and is regularly performing its functions in a manner to court and obtain admiration.

The system is a continuous one; and it is one in which simplicity of parts has reduced both manual and mechanical operation to a low point, and has brought both the speed of carbonization and the heating under absolute control. Charging is by gravity; and the rate of the descent of the coal through the retorts is determined by the rate of coke extraction, which is fixed at will, according to the quality of coal and his needs, by the engineer. The heating is by a series of combustion chambers, which also admit of complete regulation. As worked, the highest temperature is at the top of the retorts, and is graduated downwards, chamber by chamber, until the bottom part of the retort is unheated save by the internal charge of coke; and—this part of the retorts being in the secondary-air chamber—the secondary air passing through this to the combustion chambers extracts heat from the coke that is about to leave the retort. Partially in consequence of this, and partially through the removal of the coke from the zones of active external heating, there is little (more often than not no) quenching of the coke to be done. But what is of even greater importance, the economy of fuel resulting from this, and from the method of heating (which forms the subject of a patent), is so very marked in relation to vertical retort working that it will not fail to arrest the attention of gas engineers. The best use is made of the heat; and as a matter of fact there is an extraordinary degree of heat efficiency—if we may be allowed to so describe it—about the setting. Throughout, the conditions of carbonization can be maintained continuously uniform; and through absence of dust, flame, and steam, working is carried on in comparative comfort.

In reading the description, it cannot fail to be a matter of remark that certain distinctive features of the original patents of Messrs. Young and Glover are absent from the completed setting as now presented to us in the joint names of Messrs. Glover and West. The small amount of free space at the top of the retorts has been abandoned. But this does not mean that, under certain circumstances, and other methods of charging and heating, this, and the action of the radiant heat on the evolved gas, would not be an advantage. But if gain there be in the free space, it has been demonstrated by this setting that it is only to be realized by the sacrifice of other advantages and economies. Again, the passage of the gas from the retort is not now through the coal in the feeding-hoppers above. Doubts were raised, from the first, as to the utility of this. That proposal, too, has been abandoned. In short, experience points to the fact that several things that are possible with non-caking coals are impossible with caking coals. Anyway, to Mr. Young we are primarily indebted for the system of continuous carbonization under consideration to-day. For though much of what appeared in the original specifications has been eliminated from the completed plant, had it not been for Mr. Young's work, it is quite possible that Mr. Glover and the St. Helens Corporation would not have taken up the matter. And if Mr. Glover had not interested himself in it, Mr. John West would not have drifted, as he did by circumstances, into the position of collaborator in respect of this particular plant. However, it will be agreed that the final result is an efficient system of simple construction and working.

Here we are not going to particularly discuss results or any other features of the working. These are set forth for consideration in the special article published elsewhere in this issue. But there is one matter that should be specially impressed; and it is that the time has not arrived for comparison of the results of the working of the Glover and West setting with those of other vertical retort systems—continuous or intermittent. The results can as yet only be compared with the results from the working of the horizontal retorts at St. Helens; and for this reason: At St. Helens in ordinary working the slacks of local coals only are used, and with these particular slacks few gas engineers have working acquaintance, and certainly they have never before been utilized in vertical retorts. But the new settings utilizing these relatively poor slacks have given an excellent account of themselves both in respect of gas and residuals in comparison with horizontal retorts; and if the vertical retorts can do so well under the adverse condition of a poor material to work upon, they should do so much better when carbonizing the recognized and commonly used superior gas-making coals. In giving this introduction to the Glover and West vertical retort plant, it is with confidence that we anticipate it will render a good account of itself among successful carbonizing systems of the future.

Surrender at Birmingham.

It is with regret that we see (unless it be shown that temporary expediency is at the bottom of the act) that the Gas Committee of the Birmingham City Council have surrendered so easily over the question of fixing a maximum for the salaries of the Secretary of the Gas Department and the Engineers-in-Charge of the works, beyond which maximum the Committee should not go without the further consent of the Council. The proposal on the last occasion was only negatived by 29 to 27 votes, so that the Gas Committee had considerable support in the matter. The proposition as originally brought forward was the result of the well-considered judgment of the Committee. It was either right or wrong; and if it was right, it ought to have been given up very reluctantly. From whatever standpoint the position is reviewed, the original proposition commends itself as the correct one. The only objections that could be urged against it by the opposition in the Council were that there was an old and abused principle of the Council still in existence which required all increases of salary over a certain sum to be brought before them, and that the abandonment of the principle would not be consonant with the views of those members whose disposition it is not to lose an opportunity of playing to the gallery.

Subject to the explanation that will be made to the Council a week hence, we repeat the regret felt that the Gas Committee have not held to the position they took up, and done their part to break down an undesirable and demeaning state of things in connection with municipal official service. Of course, if well-deserved immediate increases of salary were placed in jeopardy by the Committee standing firm, then perhaps they are taking the right course in at once recommending a definite advance for Mr. Hampton Barber and the Engineers-in-Charge of the works (Mr. John Foster. Mr. W. Chaney, Mr. F. J. Bywater, and Mr. T. H. Hack), It is hoped, however, and far beyond Birmingham, that the matter will not be allowed to drop there; that, if it is a question of making an amendment in a general rule of

action in connection with the treatment of the officials so as to assure that the officials are not placed in any worse position in regard to publicity of personal means or remuneration than a man in private employ, the matter of amendment will be taken in hand, and not be allowed to subside until it is once and for all accomplished. The fixing of a maximum salary beyond which a Committee should not go without the sanction of the Council appeals to us as a very fair solution of the difficulty.

We have nothing further to say about the scheme of organization the Committee are putting before the Council. It is in effect only a confirmation of what was done a year ago. The report, however, shows us that every precaution has been taken to make the scheme work as smoothly as possible; and, in this connection, we are pleased to see the handsome tribute (though not more than their due) paid to the officials by the Committee. That they are worthy the additional remuneration, and the utmost respectful treatment the Council can accord them, is abundantly clear. It will be seen that it is proposed that the official designation of Mr. Hampton Barber shall henceforth properly represent the responsible duties that he discharges. His official title will for the future be, if the report is passed, Secretary and Manager.

Though not bearing upon the question in hand, another interesting feature of the report under notice is that the Gas Committee are recommending a reduction of 3d. per 1000 cubic feet in the price of gas used for heating (other than cooking) in manufacturing establishments. This will represent a lessened cost for fuel to the industries of Birmingham of no less a sum than £15,000 a year. We have constantly advocated that, so long as it can be done without detriment to other classes of gas consumers, local industries should be encouraged in every way. Their success is of paramount importance to every city or town.

The Victories of Economy.

Out of the numerous papers read at the International Congress of Applied Chemistry, there has come much matter over which, according to our diverse mental inclinations and capacities, we may with advantage reflect. The reports of the proceedings have no doubt caused many of us to wander into several fields of fresh thought, and to issue from them with respect deepened and broadened for that which is summed up in the words "applied chemistry." One of the victories of applied chemistry to which the recent congress gave pronounced form is that of the great economy in industry which has resulted from the work of the chemist. In industry, economy consists in getting more product out of a given measure of raw material, with a less consumption of energy or fuel for the greater product. "It was not "so very long since," said Professor Witt, in the course of the congress, "that we began to have a conscience "for fuel. We are now awake to the fact that the quan- "tity of fuel required for an industrial process is very much "dependent upon the way in which it is made to do its "work." In the gas industry, there is a large amount of indebtedness to the chemist and the physicist for the fuel economies that have been achieved. With a lessened fuel consumption than of old, a greater product is obtained from that which is put into the retorts; and from secondary products, that which was once wasted is now recovered—both refinement and utility being produced from the gross. In the system of regenerative gas heating, there can be perfect regulation of gas and air; and the heat can be under absolute control. The products of coal carbonization which were at one time largely a matter of chance, even of accident, are realized by defined method continued or reproducible hour by hour or day by day. As was shown during the congress, the greater exactness now brought to bear on coal carbonization for gas production is being vigorously applied in the bulk carbonization processes of coke-ovens; and there is progressively less waste of that which is useful through the application of recovery methods.

In this way, chemistry has taught us, and is still teaching us, how to get more advantage from our fuel and raw material; and it all means economy. The achieving of all possible economy is something we owe to our successors. There will be a future in which the fuel that is wasted today will be required. Those who look with confidence to liquid fuel helping substantially to conserve the stores of solid fuel will find, from the congress proceedings, that Sir Boverton Redwood does not give them any great hope of this. While there must be encouragement to the discovery and utilization of petroleum products, there must be economy; for says Sir Boverton, "I cannot give you hope "that the quantity of oil that is still in the earth is "such that it will revolutionize the fuel industry." And he goes on to issue a serious warning against "the indulgence "of extravagant anticipations as to the extent that liquid "fuel will replace coal." In the economy of fuel, and in giving the world the maximum amount of benefit from the fuel employed, the gas industry, as we have claimed, is doing a large part; and this is being done without adding to the great smoke nuisance about which much was heard during the conference. So deeply impressed were the delegates to the congress as to the waste and deleteriousness represented by smoke from the combustion of fuel, that they passed a resolution, instructing that representations be made to the Governments of the different countries in relation to the formulating of uniform laws regarding the emission of smoke and noxious fumes from chimneys. Few persons realize that smoky chimneys not only carry visible unburned carbon into the atmosphere, but in nine cases out of ten, much invisible carbonic oxide and methane, with all the latent energy they contain. Well-ordered gas-works do not plead guilty to participating in this waste. Regenerative gas heating is not only a sure preventive of smoke, but is also a powerful means of economizing heat; and the gas industry was not slow in recognizing this some years ago. A gas-works is not only a fuel-using but a fuel-producing establishment. It does its work without smoke and nuisance; it produces fuels, gaseous and solid, that help to make life pleasanter and healthier. In several directions, the gas industry demonstrates the victories of economy, through the aid of applied chemistry.

Taxation.

The publication of the Finance Bill has put all concerned in full possession of the new proposals of the Government for raising the revenue which they require; and only those who are hidebound partizans—in the political sense—will fail to concede the gravity to industry of several of the proposals. The increase in the income-tax payable on behalf of shareholders, and the increase in the duty on contract notes relating to the purchase of stock or other marketable securities, are sufficiently serious; but the new land taxes add immeasurably to the seriousness. The only consolation is that all, whether bodies corporate or incorporate, are brought into the net, in respect of the duty on the increment value of land and the tax on undeveloped land. Gas undertakings, when purchasing land for manufacturing development, naturally, with an eye to the economies of the future in the matter of extension and manufacturing convenience, do so in excess of immediate requirements; and it will be the few rather than the many gas undertakings who will be able to prove to the satisfaction of the Commissioners that the land held in reserve comes within the condition which provides that undeveloped land duty is not to be paid where the site value of the land does not exceed £50 per acre. With regard to the increment site value, there is a little concession in that there is to be a deduction of any part proved to the satisfaction of the Commissioners to be directly attributable to works of a permanent character executed *bonâ fide* for the purpose of any business, trade, or industry, other than agriculture. In the mineral rights duty, referring to ungotten minerals, gas undertakings will also be in a measure concerned as large consumers of the subterranean wealth of the earth; for these fresh taxes will, to the utmost extent possible, be transferred by the owners to the users of minerals. The same with the increment site value and undeveloped land duties, they will ultimately come largely out of the pockets of people of moderate means and the very poor. The greater part of the patrons of the gas industry come within these categories; and in whatever degree these new land and mineral taxes increase the burdens of the gas industry, to that extent will the consumers be the victims. The methods of valuation are also bound to give rise to much wrangling, between owners and the Commissioners, who are to be vested with very arbitrary powers. In the opinion of Lord Onslow, Chairman of Committees of the House of Lords, "the duties "imposed on the Commissioners, Special Commissioners, "and Referees could not be equitably discharged even by "archangels." It will further be observed that petrol is not the only motor spirit upon which the duty of 3d. per gallon (1½d. for spirit to be used for trade and other specified

vehicles) is to be placed, or, to be more correct, has been placed. "Motor spirit" is to include "any inflammable "hydrocarbon (including any mixture of hydrocarbons and "any liquid containing hydrocarbon) which is capable of "being used for providing reasonably efficient motive power "for a motor-car." Benzol is not therefore to be privileged; so that the fillip it was hoped the tax on petrol would give to the use of benzol for driving purposes must be definitely relinquished.

Points from the Factory Report.

To all whose business it is to consider the question of the heating, lighting, and ventilation of factories and workrooms, the annual report of the Chief Inspector of Factories (Dr. Arthur Whitelegge, C.B.), together with the reports of the district inspectors, supply much instruction. The report (which was dealt with last week, pp. 577, 586) has to be considered dispassionately, and with a broad mind, by those affected. It has to be remembered that the inspectors have certain duties to perform, and to see that certain laws are fully complied with. But on carefully reading the reports, the impression is forced upon one that some of the inspectors suffer from a contraction of view, induced and fostered by the very Acts that were framed to give them guidance. This surely should not be the drift of legislation. Legislation is not intended to circumscribe, and keep within hard-and-fast limits, an intelligent survey of conditions; but it still leaves the inspectors free to examine all circumstances, so that there may be a proper determination as to which (if any) of the conditions are faulty, and therefore which (if any) should be improved. There is a disposition to jump at conclusions; and particularly in respect of the requirement of section 6 of the Act of 1901, that adequate measures shall be taken for securing and maintaining a reasonable temperature in each room in which any person is employed, and that the measures so taken must not interfere with the purity of the air in the room. We admire, and favour, all the efforts that can be put forward to induce the most scientific application of all the agents employed for lighting, heating, and power. But there must not be either unjustifiable condemnation or harsh restriction. The section of the Act referred to is no doubt responsible for some of the inspectors, when they find open gas-flames are being used for heating workrooms, and the proportion of carbonic acid is high, attributing the unwholesome condition of the atmosphere exclusively to such use of the burners, without giving sufficient consideration to the large contribution in crowded workrooms of the more noxious carbonic acid derived from the respiration or the perspiration of the workpeople. We are absolutely averse to the old-fashioned open-flame burners being employed in any wrongful manner for warming purposes. It is found in workshops and factories that these burners are often used in the most wasteful fashion, and flaring away in a style that shows at a glance incomplete combustion. But it is the misuse, and not the use, of these burners that is open to censure. If dependence could be placed upon them being regulated in proper manner, and there was simple top ventilation, they would be an aid to maintaining a sanitary condition of the atmosphere. The whole question hinges on adequate ventilation. Without ventilation in crowded workrooms, there is no doubt that the open-flame burners contribute in a measure to the need for it; but with the provision of modest means of ventilation, they contribute materially to efficiency. And that is more than can be said for electric lights, which no one would think of employing for either heating or as an aid to ventilation. What is really wanted in factories and workrooms is a higher standard of ventilation. We are glad to see the favourable remarks in several of the reports regarding the growth of the use of incandescent gas-burners in factories.

Much the same observations apply to the use of flueless gas-stoves for heating workrooms. With an adequate general scheme of ventilation in such rooms, no objection could be raised to these heaters, providing proper selection be made of the stoves. There are flueless gas-stoves on the market in which the most elementary scientific considerations have been set at naught; and we are afraid that these have been the means of giving a bad name to all of the genus. It is a pity; but the fact remains. It will be a still greater pity if neglect should kill the trade in a really useful heating appliance, when used under appropriate conditions. As Dr. Whitelegge says (*ante*, p. 586), section 6 of the Act of 1901 does not limit the choice among the various means of warming; but the criterion established by the section is the avoidance of additional pollution of the air by the products of combustion. We have to squarely face this condition, and to recognize that the inspectors have been busying themselves in explaining to factory occupiers the "objections" to which flueless stoves are open. It would be quite as much to the point, and more valuable, if the inspectors would explain openly in their report their objections, so that they could be as freely discussed by those competent to do so. The inspectors have an advantage over the gas-stove makers in coming into such close contact with the users. There the issue stands. No matter the character of the ventilation, the inspectors want a flue to all means of gas heating. With a flue, all their objection goes. Miss Paterson puts in a nutshell the position taken up by the inspectors, and their attitude towards gas heating, when she says: "As a rule, "the provision of a flue is not a difficult matter; and "objection to gas as a means of heating cannot be main-"tained if the fumes are removed. . . . Gas is likely "to be the chief means of heating, in small workrooms at "least, until the cost of electricity is much less than now." There has been a strong fight between Dr. Whitelegge's department and the stove makers over this question of flueless stoves; and the Chief Inspector remarks: "In some "instances, analyses have been produced tending to show "that, contrary to the usual experience, the products of "combustion of gas contained no sulphur compounds, car-"bonic oxide, or organic matter." The result, it is clear, is that Dr. Whitelegge and his assistants are not yet reconciled to the use of stoves of any description without flues; and it will be difficult to, in the premises under their supervision, disturb in any effectual manner the influence that they are able to exert in this particular matter. At the same time, the wholesale way the flueless stove as a class is condemned, is totally unmerited.

But of far greater danger than scientifically constructed flueless gas-stoves is the use of producer and suction gas plants in factories; and yet we see no suggestion in the report other than that of ventilation in regard to them. The inspectors of the South-Eastern, South-Western, and Midland divisions, all call attention to the matter; and there is no question that the increasing use of such gases is imposing more and more responsibility upon them. The dangers to health and life from carbon monoxide poisoning, and the additional loopholes for the creation of a perilous condition of things that such plants introduce into factories, keep the inspectors very active. In places where these plants are now employed, although there may be no actual fatality calling special attention to them, it is not at all an uncommon thing to find the workers complaining of acute headache. One thing that is bound to come is this: If manufacturers use such plants, they will have to provide suitable buildings for them, and not lodge them in just any place on a works where accommodation can be conveniently found for them. There is a case recorded where a plant was installed in a basement under a large workroom, the occupants of which suffered severely from the escaping gas and fumes. The care necessary in the housing of producer and suction-gas plants, and the obligation as to thorough ventilation, are considerations to be taken account of by manufacturers in calculating the costs of these forms of providing power and heat.

Social Events in Institution Week.

The technical programme for the annual meeting of the Institution of Gas Engineers has been dealt with in previous issues of the "JOURNAL," and general reference has been made to the other events. The social side contains the usual attraction of the reception and dance by the President and his wife—on this occasion Mr. and Mrs. Thomas Glover—at the Galleries of the Royal Institute of Painters in Water Colours, where the pictures of the Pastel Society will be on view. The arrangements for the excursion on the Friday should produce a big success in numbers and pleasure. Apart from the fact that the old-world city of Norwich is the home of the President, and that there are many places of interest worth inspecting there, the reception that will be accorded the visitors will be of the most generous character. The Chairman and Directors of the British Gaslight Company—among whom are men whose names are prominent in gas administration and engineering—are inviting the visitors to luncheon at the

St. Martin-at-Palace works; and, given fine weather, the trip down the River Bure to Wroxham Broad will be most enjoyable. This trip is by invitation of the members and officers of the Norwich Corporation; and the liberal and kindly act may be taken as not only a recognition of the standing and importance of the Institution as the chief representative organization of the gas industry, but as attesting the excellent relations that exist between the Corporation and their officials and the British Gaslight Company and their officials at this station. About the Norwich Gas-Works, there are novel features—particularly in respect of the big division there is in the manufacturing operations; gas production being conducted in one part of the city, and the subsequent purification processes in another. Those engineers who wish to refresh their knowledge of these matters can do so by reperusing the special illustrated descriptive articles that appeared in the "JOURNAL" for Sept. 19 and 26, 1905 (pp. 740, 803), and the notes on Mr. Glover's lantern lecture at the Midland Association meeting, as published in our issue for Oct. 31, 1905, p. 299.

The Institution Benevolent Fund.

Taken as a whole, the gas industry is a bad supporter of funds having for their purpose common benefit or the relief of those to whom fate has been hard, and who have had direct dependence upon the industry. If the gas undertakings of the country would unitedly and systematically each subscribe annually some small sum—a five pound note or less, according to position—to in part go to the Special Purposes Fund and in part to the Benevolent Fund of the Institution, those funds would be permanently in a sound condition, and their administrators would be in a position to work free from the restraint which comparative impecuniosity places upon them at the present time. There is the Benevolent Fund. The report issued by the Committee of Management shows that last year's income (less donations) only just enabled them to meet restricted outgoings; and they end the year with the feeling that the means placed at their disposal has only enabled them to deal in an inadequate manner with the applications brought under their notice. If the list of donations is referred to, it will be seen there are several important items that cannot be expected to recur. The suggestion that the Committee of Management should be fortified by representation from the District Associations has been adopted; and it is to be hoped that this will result in a substantial accession of annual subscribers.

Mooted Tax on Automatic Machines in Prussia.

The proposed Imperial tax on gas and electricity supplies having been rejected by the Finance Committee of the Reichstag, it seems that the Prussian Chamber of Deputies has now under consideration the imposition of a licensing fee of 10s. per annum as a minimum on automatic machines. The "Journal für Gasbeleuchtung" of the 5th inst. discusses the question of whether this fee is intended to apply to prepayment gas-meters, which, it points out, differ from ordinary automatic machines in that they are not, like the latter, for use by the public at large. Moreover, as the prepayment meters are commonly used to supply gas to heating and cooking burners, it is argued that the suggested licence fee would be antagonistic to the Prussian communal law which prohibits the taxation of fuel. A fee of 10s. per annum on each prepayment gas-meter would, of course, practically prevent the use of this class of meter.

Position of the Nottingham Gas Undertaking.

Of the truth of the aphorism that "the whirligig of Time brings in his revenges," few more complete exemplifications could be found than that in relation to matters associated with the gas undertaking of the Nottingham Corporation. Those who followed in anything like detail the acrimonious controversy which arose some time ago out of the management of this important branch of Corporation enterprise will be interested, though not surprised, to learn that the responsible official who was held up to public obloquy by a party clique has amply confounded his enemies. Nobody who had any knowledge of technical details could have any doubt as to the ultimate result; but there was always the danger that platform fulminations might obscure an issue in regard to which men with professional training were alone competent to pronounce judgment. Reports presented to the Nottingham Council were employed as the medium for criticism, not always of the most friendly character, of the work of the Engineer and Manager, Mr. J. H. Brown. All this, happily, has now been changed, and the many complimentary utterances which have been forthcoming during the last few days testify to the appreciation of the admirable results which have followed upon the exercise of sound and unfettered judgment. Up to two years ago, the gas undertaking suffered from being made more or less the toy of municipal politics. There were those who predicted that if the man who was responsible for the technical details was allowed, subject to the ordinary municipal control, to perfect his plans and do his work untrammelled by irresponsible critics, the effect would soon be realized. Experience in the intervening period, which has witnessed some sweeping changes in the *personnel* of the Council, has abundantly justified the anticipation. The report submitted to the Council at their meeting yesterday, the principal portions of which will be found in another part of the "JOURNAL," disclosed the record profit of £106,940 in a year in which the possibilities have been discounted by reason of the circumstance that the receipts from residuals show a diminution of £8713, while the increase in the rate of pay granted to almost every grade of employee largely added to the cost of the department. Mr. Brown's good management has thus been adequately demonstrated.

Semi-Vertical Retorts at Market Harborough.

The report which Mr. A. T. Harris, the Gas Engineer and Manager of the Market Harborough Urban District Council, has just presented on the working of the undertaking in the past financial year was the tenth of a series of favourable statements which the Chairman of the Gas Committee (Mr. G. G. Gardiner) has been able to lay before the Council since he has held this office. The one under notice, some particulars from which are given elsewhere, is of special interest from the fact that Mr. Harris has been working with semi-vertical retorts (45's); and though the productive capacity of the plant has not yet reached anticipations, the Chairman stated that the make of gas with this particular setting had been quite satisfactory, and had undoubtedly been "a contributing factor to the success of the past year's working." As a matter of fact, Mr. Harris obtained 11,567 cubic feet of gas per ton from a cheaper class of coal than he had been previously carbonizing—50 per cent. of Derbyshire coal being employed during the year—while his sales of coke were 10·25 cwt. per ton. As the outcome of the experience gained during last winter, further improvements will shortly be made, which it is expected will increase the efficiency and economy of the new system. The good results obtained at Market Harborough are shared with the consumers, who are to have their price reduced 2d. per 1000 cubic feet, which will make, with the 1d. taken off in the two winter quarters, 3d. for the year—equivalent to a gift of £440. Being thus liberally treated, they are not likely to turn their attention to the electric light, should the Council determine on carrying out a scheme, for which they have powers now nearly lapsing; nor apparently are the inhabitants generally, for out of 466 circulars recently sent out to people in the area covered by the Council's Provisional Order, only 23 replied that they were willing to take a supply, while 342 said they would not have it. The Council, the Gas Committee, and their Manager are to be congratulated on the results so far of the working of the gas undertaking. Let them take care not to jeopardize them.

The Latest Municipal Results.

In addition to Nottingham and Market Harborough, which are referred to in separate paragraphs, there are numerous points of interest to be noted in the results of the working of municipal gas undertakings during the past year which are recorded in the "Miscellaneous News" columns to-day. From Bolton comes the report that during the twelve months the rebuilding of the retort-house at the Lum Street works was completed, and that "in the near future the costly work of altering the retort-benches into the regenerative system of firing, and providing stoking machinery, will be imperative;" while other new plant will also be necessary, "in order to keep pace with the latest improvements and cheapen the cost of gas manufacture." The make of gas shows some falling off as compared with the previous year; and the total amount to be carried to the net revenue account is £50,398, as against £56,595. Out of this, £17,500 has been voted in aid of the district rate. There is also a decreased output shown at Kendal; the remark

being made that two or three former large consumers now have their own suction-gas plants. A reduction in the price of gas is foreshadowed—the experience in the past having been that "every time they have taken a step in this direction and been generous to the consumers, they have improved their results." A hint is also thrown out that, even if the rents of cookers cannot be altogether abolished, some reduction may be made, especially to those customers "who have had them in their houses for ten years or more." The net cost of gas sold at Lancaster comes out at the low figure of 10·72d. per 1000 cubic feet; and the return from residual products is 76·40 per cent. on the cost of coal. It will be observed that the public lamps are supplied with gas free of charge; this being equal to a sum (at 1s. 11d. per 1000 cubic feet net—which is practically the average price received for gas sold) of £1594. The make of gas per ton of coal (slack) is 10,451 cubic feet; and the unaccounted-for gas is as low as 2·64 per cent. Of the coke made—13 cwt. per ton of coal—88·14 per cent. was available for sale; 11·86 per cent. being used for fuel. The surplus of £529 at Newbury has been utilized in paying for extended mains and other improvements, rather than borrowing further money for the work—the Committee feeling that "the undertaking has reached its limit in the direction of relieving the rates," and that in future profits should be devoted to meeting current expenses. There is at St. Helens an increase of just under 1 per cent. in the output; and the unaccounted-for gas is only 3·3 per cent., which, as the Committee point out, is a very low figure, considering that the whole district is much disturbed by mining operations. An outstanding feature is the fact that the income from bye-products is more than the cost of coal and oil for enrichment. The importance assumed at St. Helens by the question of vertical retorts will be gathered from what appears elsewhere. During the six years since 1903, financial improvement to the extent of £3593 has been effected by the Teignmouth gas undertaking—a deficit of £1283 having been turned into a credit balance on revenue account of £2310. Repeated reductions in the price of gas—which total 1s. 1d. per 1000 cubic feet—have not diminished the profit-producing powers of the department, but, on the contrary, have, as one would expect, exercised a beneficial effect by stimulating the consumption of gas, thus reducing the working and capital charges per 1000 cubic feet. The first year's working of their gas undertaking by the Wolstanton Urban District Council has resulted in a gross profit of £5000. The make of gas per ton of coal carbonized is, it will be noted, 11,775 cubic feet.

The Coal Position.

Temporarily, at any rate, the centre of interest in the question of coal miners *v.* colliery owners seems to have been shifted from South Wales to Scotland, where the differences between the parties have assumed a most threatening appearance; and almost anything may happen in the near future. Though the subject of wages is here the chief topic discussed, it would probably not be far wrong to assume that the Eight-Hours Bill has really a good deal to do with the present strained relations. The employers have been urging that the question of wages should be referred to a neutral Arbitrator; but the men decline to accede to this—their contention being that wages must not fall below 6s. per day, which the acceptance of the owners' proposals would cause them to do. From this it may be taken that the point involved is not only the immediate rate of pay, but the more important principle of the minimum wage. Of course, the owners base on the ruling price of coal their claim to a reduction in wages; but the men are apparently of opinion that this price should be raised to such a level as would justify the existing rates of pay. Perhaps this would be a more difficult task than the simple suggesting of it would imply. However that may be, if the employers should decide to issue reduction notices, the men state that they will regard them as a challenge, and leave off work. The Glasgow Correspondent of the "Financial Times" remarks that the trade trouble in Wales is not without important bearing on the Scotch position, as the opinion is voiced that, if the Welsh miners strike, the Scotch colliery owners will not post notices, but take advantage of the higher market values which would assuredly rule. But against this probability must be pitted the powers of the British Federation to call out their own men in every district, and make the stoppage national. He points out that the Scotch miners have £70,000 of funds; but as 80,000 miners and 20,000 others would be involved, this sum would not go far in assisting a strike. Other factors are that trade is dull, and supplies are not being taken up; while the men cannot hope for moral support from allied trades. These conclusions, if fully justified, render the position more hopeful than would otherwise be the case.

Experiments on the Compression and Transmission of Gas.

In the "JOURNAL" for the 25th ult., we gave portions of the first part of a paper dealing with the effect of compression and transmission on the illuminating and calorific power of gas. In the extracts referred to, the results were recorded of investigations with carburetted water gas carried out by Messrs. H. E. Bates and J. R. Rafferty, both of whom are engaged in the laboratory of the Peoples Gas Company of Chicago. To-day we give, practically in its entirety, the second part of the paper, containing the conclusions arrived at by two other investigators—Messrs. V. A. Houghton and S. L. Cole—who devoted their attention mainly to coal gas. The entire paper was prepared as a research contribution to the American Gas Institute from the Illinois Gas Association, at the last annual meeting of which body it was submitted and discussed. The conclusions arrived at by the authors of the first part of the paper are that carburetted water gas loses both illuminating and heating value on compression up to 100 lbs. per square inch, and that the loss of the former property is greater between 5 lbs. and 60 lbs. than with pressures up to the higher limit named. The loss of calorific value by water gas on compression is greater with high than with low candle gas. Dealing with coal gas, Messrs. Houghton and Cole conducted a series of tests immediately before and after the gas was compressed, and again when it had travelled 22 miles in a 4-inch pipe having a capacity of 11,900 cubic feet at atmospheric pressure. An average of tests carried out in July and August last year showed that in the distance named coal gas lost a candle in illuminating power and 30 B.Th.U. in heating value, and the pressure had dropped by about 6 lbs.

Temperature and Pressure Tests.

A second series of tests was conducted by Messrs. Houghton and Cole, on "straight" water gas transmitted to stations situated at three distances; and the results led to some interesting investigations in regard to the relation of temperature and pressure. It was found that low-pressure gas does not suffer any loss of illuminating power when cooled to the dew-point temperature; but that the reverse is the case with high-pressure gas, which loses to the extent of 3 candles when it is cooled down to the dew-point temperature of uncompressed gas, and drops another candle when subjected to severe pipe-line conditions. The conclusion arrived at is that there is no loss on transmission, but that it results from compression and cooling, and is dependent upon the extent of these operations. The authors submitted the results of their labours without expressing any conclusions thereon, in the hope that the investigation might be carried to the final determination of the important questions raised. For the present they say the advantage of protecting pipe-lines from exposure to low temperatures is clearly apparent from their studies, and that, where the maintenance of illuminating power is important, the advisability of resorting to the compression of gas must be studied in connection with the cost of the enrichment which may to some extent be necessary as a consequence of this operation. The paper of the four joint authors deals with a subject which has of late years attained very considerable importance; and a contribution to its literature of the character of that under notice deserves more than passing attention.

Instruction in Autogenous Soldering.—The extent to which processes of soldering and welding by means of acetylene are now being employed in engineering work is indicated by the fact that, under the auspices of the German Association for the Autogenous Working of Metals, an information bureau and a course of training for fitters have been established in Cologne. Both are in the charge of Herr Theo. Kautny, the Editor of the journal "Acetylen in Wissenschaft und Industrie;" and since the establishment of the bureau, in March last, upwards of 400 inquiries, many of them of great technical importance, have been dealt with. The Ministry of Commerce recently agreed to place at the disposal of the Association a workshop and lecture-room in the Royal Engineering College at Cologne, for use in connection with a course of instruction in autogenous soldering or welding. It is free to members of the Association, and should be valuable in affording the knowledge and training which are essential to the proper use of the acetylene welding process.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 667.)

BUSINESS in the Stock Exchange last week was not abundantly active on the whole; and it would have been quiet indeed had it not been for the lively animation in South Africans and, to an extent, in Americans. It took some little time to get into swing; for upon the reopening on Tuesday, the attendance of members was not numerous. The general tendency, however, was tolerably good. There was a demand for gilt-edged qualities, though Consols remained unchanged. Railways were rather weak; but the Foreign Market evinced strength. Quietude continued on Wednesday, and there was some reaction where strength had been. Consols fell $\frac{3}{16}$. Great dullness prevailed on Thursday—the effect of many causes not within our scope to particularize. Nearly every market was flat; while Consols had another $\frac{3}{16}$ fall. On Friday, after a quiet start, activity was accelerated, and rising prices responded to a more cheerful feeling. Consols recovered partially; and the more speculative lines above mentioned rose gaily. Saturday was a fairly busy day, and Consols had another small rise; but most of the strength was in the South African Department. In the Money Market, there was a good demand, and rates hardened materially, both for short loans and for discount, though the tendency was easier at the close. In the Gas Market business was very moderate, and not very interesting. Changes in quotations were few and slight; and the ups and the downs were pretty evenly balanced. In Gaslight and Coke issues, there was a fair modicum of dealings in the ordinary, without any change of value—transactions ranging from $103\frac{3}{8}$ to $104\frac{3}{8}$. In the secured issues, the preference was rather more active at from $105\frac{1}{2}$ to $106\frac{1}{4}$; and the debenture marked $86\frac{5}{8}$. South Metropolitan was very little dealt in, and realized from 123 to $123\frac{3}{4}$. The debenture made $85\frac{3}{4}$ and $85\frac{7}{8}$. In Commercials, the 4 per cent. changed hands at $108\frac{1}{2}$ and $109\frac{1}{2}$, and the debenture at $82\frac{1}{2}$. In the Suburban and Provincial group, Alliance and Dublin new was done at $12\frac{3}{4}$; Brentford old at 252, ditto new at $189\frac{1}{2}$, Brighton original at 213 and 214, North Middlesex new at $13\frac{1}{4}$ and $13\frac{1}{2}$, South Suburban at $120\frac{1}{2}$ and 121, Tottenham "A" at 134, ditto debenture at 103, and West Ham at $121\frac{3}{4}$. Southampton had a three-point rise. In the Continental Companies, Imperial was a point weaker at from 180 to $181\frac{1}{2}$, ditto debenture made $96\frac{1}{4}$ and $96\frac{1}{2}$, Union $99\frac{1}{4}$ (a fall of 1), European fully-paid $24\frac{1}{8}$, and Tuscan $8\frac{7}{8}$. Among the undertakings of the remoter world, Bombay changed hands at $5\frac{11}{16}$, Buenos Ayres at $13\frac{27}{32}$ and $13\frac{15}{16}$, Monte Video at $12\frac{11}{16}$ and $12\frac{3}{4}$, Primitiva at $6\frac{13}{16}$, ditto preference at $5\frac{9}{8}$ and $5\frac{5}{16}$, ditto debenture at 96, River Plate at from $14\frac{15}{16}$ to $15\frac{1}{8}$, and San Paulo at $13\frac{7}{8}$.

ELECTRICITY SUPPLY MEMORANDA.

Costs and Illuminating Powers—The Trick of Comparing the Modern with the Ancient—Consumers' Experiences—Abandon Selfish Motives and Use Electricity—Speculation and Humour—Hiring and Wiring Direct or Through Contractors.

EVER and again, people have forced on their attention by electricians the extraordinary cheapness of electricity in comparison with incandescent gas lighting, and still more singular statements as to the increase of illuminating power that accompanies the lower cost of the electrical illuminating agent. We had the case last week (p. 569) of Mr. Pringle, of celebrated Burton-on-Trent, on the lighting of St. Peter's Church, Stapenhill. Peter was not always given to veracity; but we will let bygones be bygones. In this particular church of St. Peter, electricity has displaced gas; and the electricity bill for past two quarters amounted to £3 10s. 8d., against £13 7s. 7d. for gas in the corresponding quarters of the previous year. The electric lamps number 75; and they are only of 25-candle power each. Some of our electrical friends have suppressed the fact that the gas-burners formerly in use in the church were the ancient, wasteful fishtails, and that there were no less than 288 of them. In concealing this fact, there ought to have been a severe pricking of conscience. We fear suppression of some such similar fact accounts for the wide difference that it is asserted there will be in illuminating power by the conversion at Bedford of 58 street gas-lamps to electric lighting, at a capital cost of £630. The illuminating power as a result, so it is said, will be increased, in the aggregate, from 928 to 3840 candles, though the annual cost is to be only £7 15s. more. We suggest to our contemporaries that in future they should specify the kind of gas-burners that are to be displaced; and give a few other details, so as to have some fair basis of comparison.

In last week's issue, there were also some reproductions of photographs of excellent samples of ordinary pressure incandescent gas lighting, as carried out by the Birmingham Corporation Gas Department, in certain public buildings; and actual figures were given as to costs of lighting per hour, illuminating power, &c. The installations included the famous Birmingham Art Gallery, the lecture theatre of the Midland Institute, churches, and chapels. Turning back to the church of St. Peter, about which Mr. Pringle crowed more than thrice in the electrical press, the total possible illuminating power from the 75 25-candle power Osrams is 1875 candles; and if these "candles" should, as we suspect, be Hefner units, then—having regard to the "memorandum" recently issued from the National Physical Laboratory—we have to bring that 1875 down to 1688 to represent British standard candles. In the Birmingham figures (p. 573), the closest return to this illuminating power is 1750 candles in the School of Art; and the total cost of lighting per hour there only works out to 2·18d. The lighting of Mr. Pringle's St. Peter's Church by 75 Osrams will run away with $2\frac{1}{2}$ units of electricity per hour. The 2·18d. per hour would not give much profit on the $2\frac{1}{2}$ units of electricity, nor supply much surplus for labour, renewals, &c. Commenting on the Burton-on-Trent comparison between the ancient and the modern, the "Electrical Times" remarks: "Whether fishtail burners be used without maintenance, or mantles with their *enormous* depreciation—most churches being draughty—electric light scores quite easily in church lighting." Our contemporary might make note of the fact that, in the Birmingham Art Gallery, "the mantles have lasted for a period of fifteen months without renewal; and in the Wesleyan Chapel only six new mantles were needed for 34 burners at the end of fifteen months. As "Meteor" hungers for more examples of church lighting, he might adopt those given in the "JOURNAL" last week from Birmingham.

While on this question, there are a few current matters upon which the electrical press have failed to make editorial comment. According to a South London newspaper, the Lambeth Borough Council, at a recent meeting, found themselves in the uncomfortable position of being on the "horns of a dilemma" with regard to the lighting of the libraries. It appears that in 1907, the Council asked the Libraries Committee to wire four of the libraries, with the view to consuming some £1000 worth of electricity to be supplied by agreement with the South London Electric Supply Corporation, on the understanding that the cost to be charged to the Libraries Committee should not be more than the amount previously paid for gas. The cost has turned out to be about double that of gas; and while the General Purposes Committee of the Council want to charge the full amount to the Libraries Committee, the latter claim adherence to the original agreement. The Council were asked to arbitrate between the two Committees; and 27 members sided with the General Purposes Committee and 20 with the Libraries Committee. Notwithstanding, the Libraries Committee won, as to rescind the 1907 action of the Council a two-thirds majority was required. The members voting against the Libraries Committee did so on the ground that they ought not to have electric lighting at the expense of another Committee. Would that this principle had a much wider application; and that consumers of electricity from municipal undertakings were not allowed to have the supply at the expense of the ratepayers and the consumers of other lighting commodities in the towns concerned. But the main point about this Lambeth incident is that, though the cost of electricity was to be no more than that for gas, it was double. There was a bill for electric lighting before the Marylebone County Court the other day; the defendant disputing it on the ground that it was excessive. The charge made appears to be on the maximum demand system of 8d. and 1d. For three weeks the charge came to £3 12s. 6d.; and in the sixteen weeks during which this aggrieved tenant occupied the house in question, the bill for electricity ran up to £9 5s. 9d. He declared that there was no electric light in the basement, no electricity was used for cooking, and there were no festivities at Christmas. His Honour seemed to think—the thought is common—that the purchase of the electricity undertaking by the Borough Council has not been an unmixed blessing for Marylebone; and while he regarded the charge on the evidence before him as exorbitant for lighting, he could only sympathize, and order defendant to pay the demands made upon him. The other week, too, a consumer at Grantham was disputing his account in Court (*ante*, p. 358); and a fortnight ago the Argus Printing Company were in the City of London Court fighting over an account for £14 0s. 9d. for work done. Some flame arcs were put into their premises on approval; and their case was that the trial was unsatisfactory. The decision was in their favour. These samples of litigation do not look well set against the cry of the electrical enthusiast who allows his enthusiasm to carry him past the line of discretion.

It will interest the gas engineers who will be visiting Norwich in the course of the next fortnight to learn from the Chairman of the Corporation Electricity Committee (Mr. Wild) that there are 29,000 houses in Norwich, and that at least 20,000 of these are capable of taking electricity, yet only 4400 of the tenants have seen fit to do so. There must be some sound reason for them declining to have electricity for lighting purposes. Perhaps the President of the Institution of Gas Engineers will explain in his forthcoming Presidential Address. Mr. Wild appeals to the householders of the city to support him and his Committee, by abandoning their present "selfish motives" for not using electricity. This is interesting and—well, entertaining for gas people. "If only," says Mr. Wild, "the 20,000 householders would co-operate with the Committee, what could they not do? They might by their co-operation have the best supply of electricity in the kingdom, and at the same time remove the city from the reproach of being said to be the highest rated city in the kingdom." He therefore urges the ratepayers "to co-operate with the Committee, and not let selfish motives keep them from using electricity for lighting and power." It may have sounded well when Mr. Wild uttered these beautiful words. But in these prosaic days, pounds, shillings, and pence form as powerful a motive as anything Mr. Wild can advance in deciding the direction in which to confer

patronage. We take it that, in his business dealings, Mr. Wild, as a rule—electricity may form the exception—looks to get the best value that he can for his money. We wonder how he would have framed his argument if gas as well as electricity had been under the care of his Committee.

In the opening paragraphs of the "Memoranda" a fortnight since, it was seen how the question of speculative electric wiring by municipalities is being dealt with by Parliament. If municipalities must not speculate in this direction, except through contractors, and unless they make income keep pace with expenditure, the question is raised as to why electrical contractors should not take upon themselves the whole risk. They are not responsible to anyone but themselves. The considerate suggestion comes from the writer of "Installation Topics" in the "Electrical Times." He advises contractors to plunge into the system of wiring houses as they are being built, and take their chance of getting remunerated, by the builder including the cost of the wiring in the price he asks for the house, and then paying the wiring contractor, or by securing a contract from the new tenant to take electrical current, and then getting the electricity suppliers to pay for the wiring. The writer of "Installation Notes" should be put into the manager's chair of an electrical contractor's firm that wants to make a rapid exodus *viâ* the Bankruptcy Court. The speculation suggested is a bad business proposition. Looking down a respectable collection of tenders for wiring that have emanated from electrical contractors, an idea lurking at the back of one's mind is confirmed that there are not many of the firms who are invited to tread this risky plank that are given to speculation, and especially speculation that has "folly" written big all over it. We like to read some of our electrical contemporaries. Amusement and instruction are rather frequently mixed up in a most delightful manner. The lofty style, the simulated contemptuous attitude towards the money-making rival, the pretence of supremacy—oh! it is all so droll. Hearken to this extract from the notes written to encourage wiring contractors to rash speculation: "In some such districts, the local gas company, *recognizing that electric light is usually adopted*, approaches the builder, and obtains his permission to pipe the property throughout in carcase, free of all cost. Many purchasers of house property, however, favourably they may look upon electric light, *will put up with gas* if the pipes are all run, and will hesitate to instal wires after the decorations have been completed. . . . In many cases, no doubt, if the [wiring] contractor got in first, *the gas people would hesitate to pipe houses already wired merely on the chance that anyone would prefer gas to electric light*, when both were equally available." The italicized words are full of unintentional humour. We do not, however, quite follow the argument of the writer in the last part of the quotation. What he seems to suggest that gas people would hesitate to do, is just what they would not hesitate to do. They are such firm believers in their own commodity, that they are persuaded that, in a large majority of cases where both gas and electricity were established before houses became tenanted, gas would be patronized on account of its economy and reliability, and, in the minority of cases in which electricity was patronized at all, the presence of gas would take rather a large part of the gilt off the electrical account. Something more than the presence of electric wires is required to scare away people whose business it is to sell gas.

But the writer of "Installation Notes" had a bad fall shortly afterwards; for, in a subsequent issue of the "Electrical Times," the absurdity of his suggestion was pointed out, in an indirect way, in an article that seems to have come from someone having a closer acquaintance with the editorial chair than the author of the notes in question. "The contractors," it is remarked, "have failed to meet the case of consumers who want hire or hire-purchase installations. They have neither the capital nor the inclination to do this important class of work, neither can they wire new property on the chance of effecting a sale to tenants." This is more rational than the irresponsible advice referred to in the previous paragraph. The line of the argument in the article from which these sentences have been extracted appears to be that, if Parliament is going to deny to municipal electricity undertakings general wiring and fittings powers excepting through contractors, at any rate assisted hiring and hire-purchase installations might be left to a department of the undertaking without outside intervention. "The main function of a municipal wiring department would be to carry out work which would never be done were it left to the wiring contractors; so to that extent the latter would lose nothing, while they might gain a good deal by getting some of the quite new work that would accrue from municipal *financing* of consumers." The blunt truth contained in the last five words might well be used as a cogent argument in opposition to the point of concession that it is desired to secure. But who is to draw the line between what would, and what would never, be done by the contractors? We fear that there would be scope here for illimitable disputation. But the fact that it is proposed by Parliament that the work shall be done through a contractor does not place any prohibition on assisted wiring and hire purchase; the whole point is that the work is not to be done direct by the department's own men. We, however, confess there is a drawback here, though the drawback is not so great with electricity as it would have been with gas, as the expense and restricted applications of electricity limit the field of its use to those who are in a position to do what wiring they require on their own account. That is not, however, the view of the writer of the article. As time goes on, he says, it becomes increasingly necessary to cultivate new classes of business. "The smaller classes of consumers can only be got on some scheme of free or assisted wiring; and unless the work be done in the most economical way, there is no chance of making a profit on the supply. The great drawback of wiring is its high cost compared with gas fitting; and, in many cases, the wiring of small property would be commercially impracticable if it had to yield two profits—one to the contractor, and the other to the department. Even if the department sought no profit, there would still be establishment and other charges to go on top of the contractor's price." It is clear that the metallic filament lamp has not done all that is necessary to make electricity for lighting really popular.

GERMAN GAS AND WATER ASSOCIATION.

Programme of the Annual General Meeting.

THE Annual General Meeting of the Association is to be held, as already announced in the "JOURNAL," from the 21st to the 25th inst., at Frankfort-on-the-Maine. The provisional programme of the technical proceedings, to which the three days—the 22nd to the 24th inst.—will be devoted, has now been issued. The first day—viz., Tuesday, the 22nd inst.—will be restricted to technical communications relating to gas supply. The chair will be taken by Mr. E. Körting, the General Manager of the Imperial Continental Gas Association's works at Berlin, who will deliver his Presidential Address inaugurating the meeting. The following papers will then be read:—

"A Historical Retrospect," by Mr. E. Körting, of Berlin.
"A Review of the Position of the Water and Gas Supplies of Frankfort," by Herr Kölle, of Frankfort.
"The Storage of Coal," by Herr H. Prenger, of Cologne.
"Quality of Gas in Relation to Requirements," by Dr. H. Bunte, of Carlsruhe.
"Gas Supply to Distant Places, and the Coupling-up of Several Places in a Large Area of Supply," by Herr Kuckuk, of Heidelberg.

On Wednesday, June 23, the following papers dealing with water supply, and the reports of some of the Technical Committees appointed by the Association, will be presented:—

"The Development of Water Supply in the Last Fifty Years," by Herr F. Reese, Manager of the Dortmund Water-Works.
"The Origin of Underground Water, with Special Reference to the Hessian Plain," by Dr. Steuer, of Darmstadt.
"Removing the Acidity of the Underground Water of the Frankfort District," by Herr Scheelhaase, of Frankfort.
The Report of the Committee on the Working of Water-Works, presented by the Chairman of the Committee, Herr F. Reese, of Dortmund.
The Report of the Electrolysis Committee, and
The Report of the Standards Committee, both of which will be presented by Mr. W. H. Lindley, the Chairman.

Friday, June 24, will be devoted to the presentation of the reports of the remaining Technical Committees, to private business, including the election of officers for the ensuing year, and to the reading of two papers dealing with gas supply—viz.:

"The Development of Gas-Engines," by Herr J. Körting, of Düsseldorf.
"Advances in Inverted and High-Power Incandescent Gas-lighting," by Herr Lebeis, of the Welsbach Company of Berlin.

The reports of Committees will be presented by their Chairmen as follows:

On the Constructional and Experimental Gas-Works of the Association, by Dr. K. Bunte, jun., of Carlsruhe.
On Photometry, by Dr. Leybold, of Hamburg.
On Heating, by Dr. E. Schilling, of Munich.
On Technical Training, by Dr. W. von Oechelhaeuser, of Dessau.
On Gas-Meters, by Herr C. Kohn, of Frankfort.

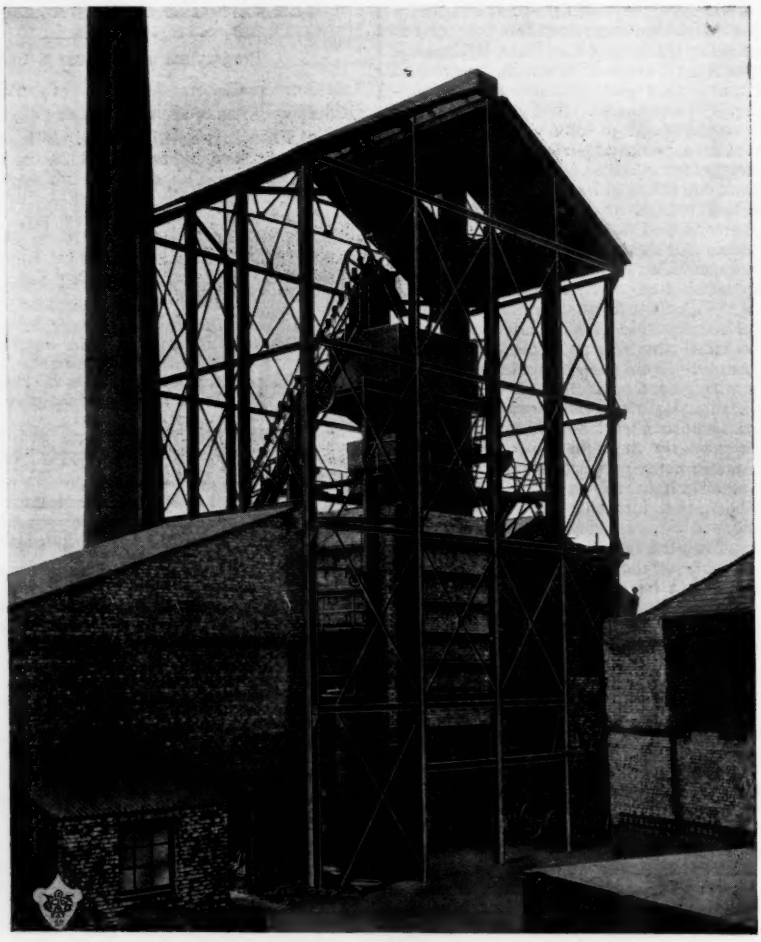
The arrangements for the meeting are in the hands of a Local Committee of which Herr C. Kohn, of Frankfort, is acting as Secretary. The Information Bureau will be established at the offices of the Imperial Continental Gas Association in the Rosmarkt; and the technical meetings will take place in the hall at the Zoological Gardens. There will be a reception by the Chief Magistrate of the City on the evening of Monday, the 21st inst., and for the afternoon of the following day a number of visits to works in the town have been arranged, including an inspection of the vertical retort settings at the Solmsstrasse works of the Imperial Continental Gas Association; the works of the Frankfort Gas Company in the Gutleutstrasse; a new Municipal Gas-Works at Offenbach-on-the-Maine, where there is an installation of vertical retorts; and the new water-works of Frankfort at Hattersheim. For the evening of the Tuesday, arrangements have been made to see performances at two of the theatres. For the afternoon of Wednesday, the 23rd inst., visits to various works and exhibitions have been arranged; and in the evening there will be an assembly and concert in the Palm Garden. On the Thursday evening, there will be a banquet and concert in the Zoological Gardens; and on Friday, the 25th inst., an excursion will be made to Saalburg and Homburg.

Unusual importance attaches to this year's meeting, because it coincides with the celebration of the Jubilee of the Association.

THE GLOVER AND WEST VERTICAL RETORTS AT ST. HELENS.

Continuous Working with Gravity Charging.

Gas engineers, not only in this country but abroad, have been patiently waiting to learn of the practical development of the vertical retort system at the St. Helens Corporation Gas-Works, together with the results of the working. But they have lost nothing by delay, as now it is our pleasure to present to them a system complete, and at work on a practical scale, taking its part —with seven months' record at its back—in the ordinary daily producing operations, and with routine precision. As a matter of fact, when we remember the period that has been absorbed in the development of other carbonization systems with vertical retorts—every day of which period could be justified—the development of the Glover and West system, including involuntary delays through various uncontrollable causes, has, it must be admitted, been somewhat rapid.



The Setting of Eight Vertical Retorts on the Glover and West System.

The system is a continuous, and not an intermittent, one; and it had its origin in the patents—known in detail to all who have made a study of vertical retort carbonization—granted to Messrs. Young and Glover. The work of the late Mr. William Young—the former co-patentee—as a pioneer in the successful application of vertical retorts for the purpose of distilling shale is well within the knowledge of, and is highly esteemed by, our readers. The system, however, that has been developed to a practical success at St. Helens, as we are about to describe it, is covered by patents and inventions, in which Mr. John West, of Manchester, is associated with Mr. Samuel Glover. But it must not be thought that features which it was expected would find a place in the St. Helens setting have not been tried. In designing the plant as now erected, Mr. West wisely arranged it with a series of valves and bye-pass connections, so that the theories advanced by Messrs. Young and Glover in their original patent could be tested, as well as working with or without the hydraulic main. It was finally proved, after many experiments, that the most satisfactory method was to work with a full retort, and dispense with the hydraulic main—having separate valves to each retort, and automatically feeding in the coal. Everything was so thoroughly thought-out, that all the changes contemplated have been made without letting-down the setting since it was started; and the whole plant, we can bear witness, is working regularly and in an excellent manner.

The New Vertical Retort-Setting.

In a light steel-framed structure—partly filled in with 9-inch brickwork at the lower part, then with 4½-inch brickwork above, the upper panels partially rough boarded-in for protective purposes, and with a light galvanized iron roof over the whole—was found the setting of eight vertical retorts whose operations were soon to be admired, for it was at once obvious that, in the installation, continuous working had been reduced to a matter of fine simplicity. But we pause a moment to remark upon the lightness of the structure that has sufficed to protect the setting during the rigour of the winter through which we and it have but lately passed; for it was in October last that the plant was first set to work. It will be a matter for congratulation if, with the coming of the vertical retort system, a cheaper method of building the structure sheltering carbonizing plant becomes the vogue; and there is no reason—as instanced here—why it should not, and capital expense be saved. Some vertical retort constructors go so far as to say that anything more than a light top covering is unnecessary; but Messrs. Glover and West are not of that way of thinking.

The building, however, does not in itself possess the interest of that which it encloses; but we cannot proceed without at once complimenting the Chairman and the members of the St. Helens Corporation Gas Committee upon the completeness given to the installation, and the thoroughness of the test that this has allowed, not only in their own interests, but to the satisfaction of the gas industry at large, the professional men of which have for some time had their eyes turned to St. Helens for definite information as to the working of the new process. With the thoroughness of Mr. Samuel Glover, with manufacturers on the large scale as members of his Committee (men who are aware that the value of processes must, to be of use, be tested in a practical way, and on a reliable scale), and with the same life-long principles animating Mr. John West, it has been anticipated that, with the publication of description of structure, there would be something positive at

hand. We have that "something" in the finished process and the dependable results.

Running the eye generally over the installation at St. Helens before going into particulars, we see a working combination of eight 20 feet through verticals, complete with coal-breaker, elevator, coal hoppers, and shoots to the retorts, coke-extractors and coke-receiving chambers, with patented outlet-doors, and all the necessary retort-bench bracing, staging, staircases, valves, gas and tar mains, governors, and other plant. Following the foul main across a short distance of the yard, we see the condenser connections, exhauster, tar and ammoniacal liquor extractor, scrubber, and purifiers, tar and liquor tanks. Then, in an adjoining building, is a station meter, a jet photometer, a photometer room, fitted with a 10-candle pentane lamp, standard burners, calorimeters, and so forth; and outside there is a 1000 cubic feet test holder, to which, through the twenty-four hours a continuous stream of gas can be passed from the vertical retorts, so as to store for testing purposes a representative average of a day's make, instead of taking samples at different periods of the day. We have here, in fact, a miniature gas-works with the carbonizing plant, in point of dimensions, on the ordinary working scale. Never indeed has a new carbonizing plant been better equipped to carry practical experiments to a successful and conclusive issue, and to independently test against the working results of the existing system. The vertical retorts and the auxiliary machinery were erected by West's Gas Improvement Company, Limited, of Manchester, who are the sole makers for the Glover and West system.

Some Details of the Setting.

With this hasty glance at the constituent parts of the installation, we may profitably devote a little time to a closer examination of the central feature—the setting—the principles involved in it, together with the methods of operation. The ground space occupied by the eight retorts in the one setting is 17 feet by 13 feet. From ground level to the top of the brickwork of the stack, the height is 33 feet; and the height above this to the top of the coal-storage hopper into which the elevator delivers, is 18 feet. There is 9 feet of headroom below the retorts; but depending from them are the coke-hoppers. So there is no unnecessary space here, other than that essential for the comfortable discharge of the operations associated with the system. The eight retorts in the setting are of special oval section, 24 in. by 12 in. at the top, expanding to 30 in. by 18 in. at the outlet end. The retorts are 20 feet long. Presently there will be something of interest to say about their heating; for upon the heating of the setting (as, in fact, has been the case in all the details) a good deal of thought has been expended.

Before ascending to the top of the setting, it is observed that the waggons bringing the coal supply to the vertical retorts come from the old coal-store; and the coal goes through the usual cycle of operations. It is delivered by the waggons into the coal-breaker at the foot of the elevator, which then raises it—once a day is sufficient for the present installation—to the storage coal-hopper at the top of the setting. The capacity of the elevator and coal-breaker is roughly 20 tons an hour.

At the Top of the Setting—Noiseless, Smokeless, and Dustless Charging.

Reaching the top of the setting, one can hardly tell that it is at work. There is no mechanical movement of any kind. It is only when the elevator is delivering, for about two hours a day, into the coal-storage hopper that there is any noise whatever at the top of the bench; and only about once in four hours has the man in charge to ascend to the top to open the valves between the storage and the feeding hoppers; and gas making is then a silent, automatic operation until the exit of the coke at the bottom of the retorts. On top, the brickwork of the setting is only just warm; and the gas-outlet pipes are not much hotter. There is, in fact, an infinitesimal loss of heat by radiation here; and the same may be said of all other parts of the setting. It will be seen, as the description proceeds, that the original idea of a moderate free space in the top of the retorts has been sacrificed to simplicity, and that the gas is taken off at the top of the retorts without passing through the coal-hopper above.

The coal hopper is capable of holding 20 tons; and as each of the retorts has, under its present conditions of working, been carbonizing about 2½ tons a day, the 20 tons is just sufficient for a day's work. The hopper has four conical-shaped extensions from the bottom, which deliver through a hand-worked gas-tight valve, into the feeding chambers (seen in the photograph of the setting taken before the external framing was bricked in), which are partitioned so that each one feeds into two retorts. The feeding chambers are in direct communication with the retorts; and when they are periodically replenished from the storage hopper (which is the work of only a few minutes), there is really in them a head of coal that will last for four hours' feeding. It will be seen from this, that the retorts are charged entirely by gravity, and without mechanical aid. The coal storing and feeding hoppers, it should be mentioned, are suspended by girders supported on the buckstays, so that the retort-stack is entirely relieved of the weight of the hoppers and their contents. At the junction of the ironwork of the feeding hoppers and the top of the brickwork of the setting, provision is made for the upward expansion of the latter in manner somewhat similar to a purifier lute, with a filling of lime or other soft material after expansion has taken place. All this top work is easily examined by the platform running round the setting.

The next thing that arrests notice is the gas outlet-pipe that runs laterally from the top of each retort. This outlet is a short bent pipe, upon which there is a rectangular sealed faced door 9 in. by 6 in., so that if any cleaning out is necessary it can be easily and instantly accomplished. Through the centre of the door is a small turned plug, about 1¼ inches in diameter, through the opening occupied by which a bar can be inserted to ascertain the relative position of the carbonized and uncarbonized portions of the charges. This short length of outlet-pipe (which has a valve attached to it) drops almost immediately—so acting as a descension-pipe, and not an ascension-pipe—into the foul main, which has a good fall to the condensers. There is no ascension-pipe, nor any hydraulic main. By the side of each gas outlet-pipe there is another hole, covered by a ball, and perforated by a hole through the centre. By turning this ball so that the hole is in a downward direction, a rod can also be used here, if required, to ascertain the positions of the carbonized and uncarbonized portions of the charge. For scurfing purposes, the ball is removed entirely; but this is an operation that has been rarely required during the seven months' working.

Solidity of Structure a Necessity.

With such vertical retort-settings as this, one essential to success is that the structure shall be of a substantial character, to withstand the variations of temperature to which it is exposed in its different sections. The joint designers of the setting attach the greatest importance to the best of material and workmanship being employed in connection with the system; and, under the supervision of Mr. West, West's Gas Improvement Company have put into the setting work of a very strong and substantial character. It is seven months now since the setting started; and the brickwork and ironwork so far as they are capable of examination are in as perfect order to-day as when the plant began work. Every brick in it is made of fire-clay; the buckstays, uprights, and cross-bracings are all substantial; and they look as though they were fitted in position but yesterday. The old mode of solid construction has been adapted to the most modern mode of carbonization. It pays; for it means longevity.

The Heating of the Setting—Raising the Temperature of the Secondary Air by the Spent Coke.

The producer for the heating of this setting of eight verticals is at one side; and on a platform, about 15 feet from ground level, is seen the charging mouthpiece, covered with a hermetically sealed lid. The charging of the furnace is performed once every four hours with cold coke, and measured so that the consumption is known to a nicety. The fuel account is not more than 12 to 13 per cent. of the coal carbonized, which is notably low. The furnace was seen to be working admirably, and everything visible was in excellent condition. The setting, be it remembered, has been at work for seven months; and the bars of the furnace were in the condition that one looks for in bars of more recent introduction. Clinkering is performed at intervals varying from 24 to 48 hours, according to the quality of the coke.

Regarding the heating of the retorts—the system is fully protected under the patents of Messrs. Glover and West—temperature regulation is absolutely at will; and any part can be heated precisely as may be required. This is accomplished by a series of combustion chambers from the top to within 3 feet of the bottom of the retorts; and this 3 feet of the bottom section is not subjected to the heating gases—being run into the chambers in which the secondary air passes on its way to the regenerators and combustion chambers. Here the secondary air extracts heat from the hot coke that is nearing its point of discharge, so that the air assists in cooling the coke; and the coke performs the useful function of heating the secondary air. Judging of the condition in which the coke passes from the setting, and the small amount of radiated heat found at any part, we do not know that we have ever come across a setting in which the heat is so completely confined and utilized as in this one. This has a very appreciable effect in producing the low fuel account.

The method of heating the setting is to have it at a higher heat at the top than at the bottom; and this is readily accomplished through the distinct combustion chambers provided. There is a division wall between the two rows of retorts. From a common channel at the side of the setting, there is a port-hole giving entrance to the producer gases in each pair of combustion chambers. On either side of this gas-inlet is a port-hole for the admission of the heated secondary air. Combustion takes place on each side of the division wall, and there is free travel round the retorts—the waste gases passing out into a common flue, and on to the next pair of chambers. With the accretion of the waste gases, and the supplementing of the secondary air in the successive chambers, the graduated heating of the retorts from top to bottom is secured by this patented arrangement. An inspection through the sight-holes provided at the side of the setting, shows a gradual rise of temperature upwards, chamber by chamber, until in the top chamber heating is seen that has been the admiration of all who have so far had an opportunity of making an inspection.

The Extraction of the Coke.

The patentees of this new system of carbonizing in vertical retorts have more than one system of extracting the spent charges

from the retorts. But on the present occasion it will be sufficient to refer to the one witnessed in successful operation at St. Helens. Beneath the retorts is the coke-receiving hopper, partitioned into four separate chambers, so that two retorts deliver into a single chamber. Each chamber has a curved swing cover over the bottom outlets; and this serves as a container for a shallow water seal, which is replenished by a water-tap on the side of the hopper after every discharge of the coke. At the bottom of each pair of retorts is a plate, which practically forms a base for the charges. On the top of this plate is a "wiper," or rotary arm, which slowly revolves—making only one revolution in from fifteen to twenty minutes—and pushes the coke off the plate into the receiving-hopper below. At each of the four corners of the hopper is a spindle by which the "wiper" is revolved. Each pair of spindles is operated by arms connected with a reciprocating bar, which, in turn, is operated through reducing gear—the motive power being provided by one of West's Gas Improvement Company's engines in an adjoining engine-room. The speed can be varied at will, according to the coal being carbonized. Hence it follows that the speed of carbonization and the quantity of coal passed through the retorts in twenty-four hours are completely governed by the rate at which the mechanical discharge is effected. If the coal is wet, or, from any other cause, wants more burning off, the means of extraction can be regulated to meet the conditions. At the present time, as previously stated, 20 tons of coal are being passed through the eight retorts per day; so that each retort is carbonizing 2½ tons. Thus the travel of the coal from top to bottom takes about 12½ hours. The coke is removed from the receiving chambers about every half hour at present; and it is carefully weighed each time—one discharge from four retorts that was personally examined weighing 6·1 cwt.

The operation of discharging the retorts is interesting to watch. From this small installation the coke is barrowed; but for the larger installation in prospect coke-conveyors will be used. The water-sealed covers of the coke-receiving hoppers are operated by a lever worked by hand. At the first short pull at the lever, the water in the curved lid escapes, and as the lever is fully pulled out, the coke discharges into the barrows in excellent condition—solid, large, dry, and bright, and practically without breeze. The local manufacturers are already learning the value of this coke as compared with the ordinary; and they willingly pay 2s. 6d. per ton more for it. Practically no quenching at all is required. Such indeed have been the advantages of the Glover and West system of heating the secondary air by the outgoing coke, that the coke only occasionally requires the addition of a little water for the purpose of quenching it; and consequently the absorption of the heat of the coke by the secondary air results in considerable economy in fuel. Therefore, this forms a very valuable part of the installation.

The Question of Steam Admission.

There is one question that may be raised in the minds of readers; and that is as to whether, with the water seal at the bottom of the coke-receiving hopper, there is any appreciable amount of steam admitted to the retort. There is not; and a moment's consideration will prove it. When the first droppings from the retort have made a bed at the lower part of the coke-receiving hopper, the water is completely insulated, as it were, from the subsequent discharges. As a matter of fact, the patentees have, after mature consideration, abandoned all idea of the admission of steam, for several reasons, which, summed up, have convinced them that from it there is no material advantage to be gained, but rather harm.

Wear and Tear.

As to the question of wear and tear, after only seven months' working it is impossible to speak with any amount of positiveness. But the length of time is sufficient to enable the patentees to say that the item of wear and tear will be on a low scale. Just consider the conditions with this process of continuous working. The charging is in small quantities by gravity. There is nothing to cause trouble. The retort is not subject to any violence or rapid fluctuations of condition through the admission of heavy cold charges, and the withdrawal of highly heated ones. The travel of the charge into and out of the retort is as gentle as it possibly can be. Mechanical operation is limited to the 20-minute revolution of the "wiper" extracting the coke at the bottom of the retort. The retorts have only required scurfing twice since they were started. These are all points in favour of a low wear and tear account.

Labour.

At the present time, it is impossible to say much about the question of labour. On this setting of eight retorts, there is one stoker per shift, at 5s. 6d. per shift, whose duty is to look after the driving-engine, exhauster, and the whole of the plant, the feeding of the coals to the retorts and coke to the furnaces, and the removal, weighing, and tipping of the coke in the coke yard. There are also two labourers during one shift, at 3s. 9d. each per shift, to unload the railway waggons, elevate the coal into the top hoppers, and attend to the weighing and elevating of the coke for the furnaces. The cost of the three stokers and two labourers amounts to £1 4s. per day, or 1s. 2d. per ton of coal carbonized; and this shows a considerable reduction as compared with the cost of working in the horizontal retort-house. These men are only partially occupied, and could attend to at least two settings of retorts per shift, which would reduce the cost by one-half. During the whole of the experiments, the coke produced and that required for the furnaces has been carefully weighed, so that, in the ordinary way of working, the operations in vogue at present would be considerably reduced. Mr. West estimates that, with a moderate sized installation, the labour costs would be from 6d. to 9d. per ton according to locality.

All Tests on an Independent Plant.

Before referring to the results from tests made on the plant in the course of ordinary working, both by the contractors' engineers and chemists, and independently by Dr. Harold G. Colman, over a period of some days with great comprehensiveness, we will just take a glance at the auxiliary plant which gives to this setting the advantage, in the trials and tests, of being a complete gas-manufacturing unit. When treating of the plant at the top of the setting, we traced the course of the gas from the head of the retorts through the short descension-pipe into the 10-inch foul main. The plan shows the disposition of the auxiliary plant. All the connections it will be seen are 10-inch. The 10-inch foul main runs across the yard—connecting up first with a retort-house governor (fitted with a bye-pass), on to the 10-inch vertical condensers, only part of which, however, are in use. At the bottom of these condensers beautiful thin tar—that is to say, beautiful as tar goes—of a brownish appearance, is seen escaping; and then we come to the exhauster. In passing, it is noticed that there are gauges situated at different parts all through the plant—at the top of the retorts and at the bottom, and interspersed among this external condensing and purifying plant; and, making allowance for friction, it is remarkable how level the pressures are maintained. Then the gas passes through a tar extractor, and ammoniacal liquor scrubber. All the condensed tar and liquor from all parts of the plant run into a common 8-feet diameter tank above ground, where it is measured before being run off into the ordinary works' tar and liquor well. From the scrubber, the gas passes to the purifier, where it is treated by oxide of iron, and not by lime as is that from the horizontal retorts. The gas is registered by a separate station meter (which has been certified by the makers), before passing to the common storage of the works. As already stated, a special photometer and testing room has been fitted up, and a 1000 cubic feet test holder is available for the tests, into which a continuous sample of the gas can be drawn throughout the twenty-four hours. Thus, it will be remarked, everything is distinct from the ordinary working; everything can be got at; everything can be completely measured and tested at will. And there can be no question about anything.

Some Miscellaneous Notes—Uniform Pressure and Other Conditions.

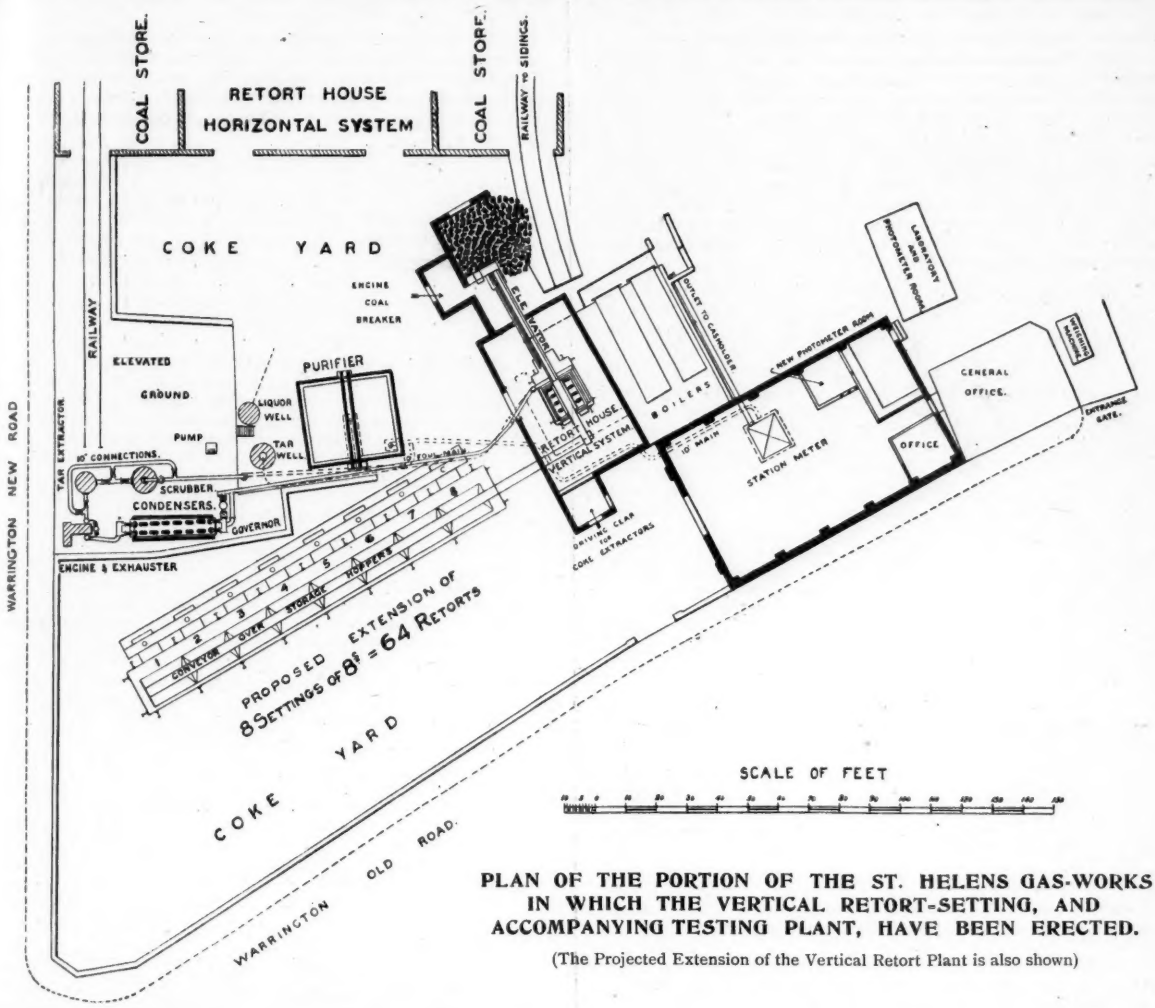
There is another noticeable feature about the working of these continuous retorts; and it is that in them the conditions may be said to go on from hour to hour and day to day with methodical consistency. The pressure-gauges connected at the top and bottom of each retort indicate the uniformity of pressures as between the top and bottom of the retort and as between retort and retort. There is a little oscillation when the coke is removed from the hoppers below; but then it is observable that the pressures settle down again to normal almost instantly. Remember that such material as slack or washed nuts is being used in these retorts; and it will be admitted that, with such close lying material, to have level pressures at the top and only one-tenth difference at the bottom is an excellent condition of working. With such a small variation between top and bottom, there cannot be much difference in the pressure at the middle of the retorts. With loose material, the pressure, there is no question, would be about the same throughout the length of the retort.

There is an interesting point as to the condition of the charges in the retorts. Reference has been made to the facilities provided at the top of the retorts for testing by a rod the characteristics of the charges. Testing in this way, the formation of the charge appears to be composed of 2 to 3 feet of coke at the bottom of the retort, and then the uncarbonized portion seems to take a V-shape, with the spent portion of the charge on the outside. This being so, the travel of the gas must be through the colder or uncarbonized portion of the charge; and this is proved by the low temperature of the gas passing into the descension-pipe at the head—viz., 160° C.

Another instructive feature is that in these eight 20 feet length retorts, 20 tons of material are carbonized per day. In the eight retorts, there are 160 feet length; so that, given a production of 11,500 cubic feet per ton of local slack (in the use of which for gas making St. Helens appears to stand almost alone), the production is upwards of 1400 cubic feet per foot-run of retort per day. If a Durham, or some other high-class, coal were used, the make per ton and per foot of retort would, of course, be considerably higher. It is understood, however, that arrangements will soon be made for carrying out tests in the vertical retorts on coals commonly used in other parts of the country, under the same exact conditions that the tests with the local slacks have been made. The results of these tests can be incorporated in a subsequent article.

A Thorough Testing, and a Fulfilled Stringent Stipulation.

As has been said, the contract for the setting was entrusted to West's Gas Improvement Company, Limited, of Manchester; but it was upon certain fixed conditions—the Corporation Gas



PLAN OF THE PORTION OF THE ST. HELENS GAS-WORKS IN WHICH THE VERTICAL RETORT-SETTING, AND ACCOMPANYING TESTING PLANT, HAVE BEEN ERECTED.

(The Projected Extension of the Vertical Retort Plant is also shown)

Committee stipulating that the contractors should guarantee to improve upon the carbonizing results and labour costs of their existing retort-house, and, failing this, that the whole of the plant was to be removed from the site without any payment whatever. When completed, the apparatus was for some time thoroughly tested by the contractors' engineers and chemists. They also obtained the services of independent operators to test the plant; and the results, which were very satisfactory, were reported to the Gas Committee as follows.

Independent Experiments made by MR. J. E. BLUNDELL, *Chemist and Analyst, Southport, with Eight Vertical Retorts, 20 feet long, continuously for three days, commencing March* 10, *finishing March* 13, 1909.

Coal carbonized, washed Orrell nuts. (containing 5·35 per cent. of moisture, for which no allowance has been made.)	61 tons.
Total gas made (N. T. P.)	718,552 cub. ft.
Gas made per ton ,,	11,779 ,,
Illuminating power	15·74 candles
Calorific value, gross	600·25 B.Th.U.
Calorific value, net	541·94 ,,
Tar per ton of coal	16 gallons
Ammoniacal liquor per ton of coal	40·76 ,, 10 oz.
Sulphate of ammonia	34·33 lbs.
Coke per ton of coal	14·34 cwt.
Fuel, coke per 100 lbs. coal carbonized.	12·02 lbs.
Coal carbonized per retort (three days' test) per 24 hours	2 t. 10 c. 3 q.
Gas made per retort (three days' test) per 24 hours	29,939 cub. ft.
Yield of gas per foot length of retort per 24 hours	1496 ,,
Coal carbonized per retort (eight days following above experiment) per 24 hrs.	2 t. 11 c. 1 q.
Gas made per retort (eight days following above experiment) per 24 hours	30,710 cub. ft.
Yield of gas per foot length of retort per 24 hours	1535 ,,

Composition of Gas.

	Per Cent.
Carbon dioxide	2·0
Unsaturated hydrocarbons	2·8
Oxygen	nil.
Carbon monoxide	7·2
Methane	33·57
Hydrogen	50·94
Nitrogen	3·49

Horizontal Retort-House.

April 13, 1909.—A test was made with washed Orrell nuts of the same kind as used in the above experiment with the vertical retorts, with a view of ascertaining the difference in volume of gas obtained between each system of working. 140 retorts 10 feet long were in use, with excellent heats; and these were charged with coal very evenly with West's manual machinery, and most thoroughly burnt off—the results being as follows:

Coal carbonized (washed Orrell nuts)	86 t. 2 c. 2 q.
Total gas made (N. T. P.)	905,215 cub. ft.
Gas made per ton	10,510 ,,

Advantage of volume obtained in the verticals over the horizontals, per ton of coal carbonized, 1269 cubic feet.

The bulk of the coals used at the St. Helens works are cheap washed and other slacks of the neighbourhood; and these produce on the average about 10,000 cubic feet per ton; the gas being enriched with oil gas made by the Peebles process.

To make a comparison in the verticals, as against the above results obtained (upon the average) in the horizontals charged by machinery on April 19 to 22, 1909, two kinds of these cheap slacks, of which about 70 per cent. is used throughout the year, were tested—viz., three trucks of washed slack, three trucks of fine Arley slack mixed together; the results being as follows:—

Total weight of coal carbonized	49 tons 6 cwt.
Total gas made	569,500 cub. ft.
Make of gas per ton of coal carbonized	11,551 ,,
Average illuminating power	16·73 candles.
Average calorific value, gross	592·67 B.Th.U.
,, ,, ,, net.	542·50 ,,

The coke produced in the verticals was of excellent quality, having a higher heating power; and the breeze from the coke is less than from the ordinary retorts.

The illuminating power for the horizontals could not be obtained, as the gas was enriched in transit to the station meter.

The illuminating power tests were made on the No. 2 "Metropolitan" burner.

The calorific value was taken with Junkers apparatus.

The whole of the plant and machinery worked in a most satisfactory manner without a hitch during the whole experiment.

(Signed) J. E. BLUNDELL,
Chemist and Analyst.

The Corporation Gas Engineer (Mr. S. Glover) also reported that the working of the plant had been very satisfactory, and that

excellent results had been achieved; and in the annual report of the Gas Committee, the following paragraph appears:—

During the period under review, the new method of carbonizing coal in vertical retorts (which our Engineer, in conjunction with West's Gas Improvement Company, has introduced by arrangement with the Committee) has been worked for a considerable time; and the Committee have taken great interest in the development of the new system, and have had it officially tested on behalf of the Corporation by a competent London expert, who has reported very favourably of the system, and the way in which it is worked. This new system of setting retorts is likely to prove of particular value to the Gas Estate, as it is the only hope we have of being able to increase the production of gas at the old works; and our Engineer is to be congratulated upon having taken another important step in advance.

It will be observed from this that the Gas Committee attached very considerable importance to the fulfilment of the guarantee, as the system was so great a departure from that in operation at their works. Hence the arrangement for an independent expert to thoroughly test the plant, in order to arrive at the full and complete measure of the value and advantages in every detail to be obtained by the adoption of the system. Their choice fell upon Mr. A. E. Broadberry, the Engineer of the Tottenham and Edmonton Gas Company (with a chemist), to make complete experiments with the plant. These experiments have been carried out; and Mr. Broadberry has reported that the whole of the guarantees imposed upon the contractors by the Corporation have been fulfilled, and that the results are superior to the working of the old system—the make of gas per ton of coal carbonized being increased considerably, more tar being produced of better quality, the coke also being of enhanced quality, while the cost for labour is materially reduced. The tests were made against the retort-house, containing 24 beds of through retorts, operated by West's manual stoking machinery, so that the standard set (using the same class of coal) may be said to be a good one.

Results of Dr. Colman's Tests.

The patentees acted wisely in also placing the plant under the entire control of Dr. Colman for making independent measurements and tests over several days' ordinary operation; and his results will be taken as unimpeachable in the matter of care and veracity. The coals used in these tests were washed nuts—similar to those tested in March by Mr. Blundell; the difference being that in Dr. Colman's test *the heats of the retorts were at a somewhat lower temperature.* After witnessing the working and the results, it is not by any means to be admitted that the returns secured by Dr. Colman exhaust the possibilities of the system—even using the class of coal that he employed.

Chemical Laboratory, 1, Arundel Street, Strand, W.C., May 29, 1909.

Dear Sirs,—I beg herewith to present my report upon the test made with the installation of continuous vertical retorts at the St. Helens Corporation Gas-Works, during a period extending over four days from May 20 to May 24.

Disposition of Plant.—The installation in question consists of a setting containing eight vertical retorts, 20 feet in length, heated by gaseous firing from a generator combined with the plant. The gas produced is condensed and purified in plant which is entirely separate from that dealing with the gas from the horizontal retorts; the gas passing through a dry main to the foul main, thence through a set of vertical atmospheric condensers to the exhauster, after which it traverses successively a washer, scrubber, and oxide purifier, passing thence to the meter, after which it mixes with the gas from the horizontal retort-house.

Method of Carrying out the Test.—The coal used was weighed in the railway waggons over the Corporation machines, and elevated into the large overhead bunker common to all retorts. Between the latter and each retort a smaller bunker is fixed; each pair of small bunkers being separated from the large bunker by means of a slide-valve. At the commencement of the test, at 10 a.m. on May 20, matters were so arranged that the small bunkers were all full up to the level of the slide-valve, the large bunker being empty; and the same conditions were fulfilled at the close of the test at 10 a.m. on May 24, so that the ascertained weight of coal from the machine represented the actual quantity carbonized. In the same way, the generator was completely filled at the commencement of the test, and again at the end—the coke added in the interval being all weighed in. The clinker from the furnace was picked, and the unburnt coke returned to the generator unweighed.

The coke was dropped from the discharging devices into barrows at half-hourly intervals, and weighed after standing for a short time.

Two tanks are provided for the tar and liquor. In the first, the tar and virgin liquor from the foul main and condenser collect; while the second contains liquor which is constantly circulated through the washer by means of a pump, and into which the scrubber liquor also runs. The first tank was emptied at the commencement of the test; and the volume and strength of the liquor in the circulating tank ascertained. The tar and virgin liquor obtained in the first tank during the test were measured and sampled; and the increase of volume and strength of circulating liquor at the end of the test determined and included in the ammonia production—account being also taken of the tar deposited in the second tank; this having been separated by the action of the washer. In addition, the amount of ammonia in the gas leaving the scrubbers was determined and allowed for.

The dry purification was effected by oxide of iron only; and no air was admitted for revivification during the test.

Results Obtained During Test, May 20-24, 1909.

Coal Carbonized.—The coal carbonized consisted of washed Orrell nuts, containing the following quantities of moisture and ash, as determined from an average sample collected from the various trucks used as they were unloaded:—

Moisture	3·95 per cent.
Ash	6·94 ,,

The total weight carbonized during the 96 hours of the test amounted to 74 tons 14 cwt.

Gas Made.—The total quantity of gas produced during the period amounted to 855,236 cubic feet, corrected to 60° Fahr., 30 inches barometer.

Yield of gas per ton	11,448 cubic feet.
,, ,, ,, diem	213,800 ,, ,,
,, ,, ,, retort per diem	26,725 ,, ,,
,, ,, ,, foot length of retort per diem	1,336 ,, ,,

Quality of Gas.—As the gas made from the vertical retorts mixed with the gas from the horizontal retorts before the holders, separate arrangements were necessary to obtain an average sample of the gas; and the existence of a holder of some 1000 cubic feet capacity, in connection with the test plant of the Corporation, enabled this to be done in a satisfactory manner—a stream of the gas as made being led into this holder over considerable periods, and the collected gas then used for the determination of the illuminating and the calorific power.

The illuminating power was ascertained on the bar photometer, using the Harcourt 10-candle pentane standard and the "Metropolitan" No. 2 burner. The calorific power was determined by means of the Junkers calorimeter. Eight samples in all were collected; the period of collection being eleven hours, except in the first instance—the gas being sampled therefore for 85 out of the 96 hours the test was in progress. The results obtained were as follows:—

No.	Sample Collected.	Ill. Power. Candles.	Calorific Power. B.Th.U. Gross.	B.Th.U. Net.
(1)	May 20, 12.30 p.m. to May 20, 8.30 p.m.	16·85	592·0	534·7
(2)	May 20, 9.30 p.m. to May 21, 8.30 a.m.	15·83	591·0	526·4
(3)	May 21, 9.30 a.m. to May 21, 8.30 p.m.	16·86	594·0	542·9
(4)	May 21, 9·30 p.m. to May 22, 8 30 a.m.	16·06	580·4	525·8
(5)	May 22, 9.30 a.m. to May 22, 8.30 p.m.	16·02	580·4	520·0
(6)	May 22, 9.30 p.m. to May 23, 8.30 a.m.	16·19	589·4	527·2
(7)	May 23, 9.30 a.m. to May 23, 8.30 p.m.	16·46	584·0	524·5
(8)	May 23, 9.30 p.m. to May 24, 8.30 a.m.	15·94	593·5	534·9
	Average	16·28	588·8	529·6

Composition of Gas.—Samples of Nos. 3, 4, and 6 were taken, and subjected to complete analysis, with the following results:—

	No. 3.	No. 4.	No. 6.	Average. Per Cent.
Carbonic acid	2·1	1·8	2·0	1·97
Unsaturated hydrocarbons	2·7	2·8	2·6	2 70
Oxygen	Nil	Nil	Nil	Nil
Carbonic oxide	9·9	10 0	9·8	9·90
Methane	32·4	31·2	32·3	31·97
Hydrogen	49·7	51·3	51·0	50·67
Nitrogen	3·0	3·1	2·1	2·73
	99 8	100·2	99·8	99·94

Production of Coke.—The total weight of coke produced during the test was 55·34 tons, weighed moist. An analysis of an average sample collected from each barrow as weighed gave the following results:

Moisture	4·0 per cent.
Ash	10·8 ,,

Therefore the yield of coke moist as weighed equalled 14·8 cwt. per ton; yield of dry coke equalled 14·2 cwt. per ton.

Generator Fuel.—The total weight of moist coke used in the generator was 9 tons 8 cwt.; and therefore:

Fuel used equalled 12·56 per cent. of moist coke.
,, ,, ,, 12·06 ,, dry ,,

Yield of Tar.—The total yield of tar, free from liquor, was 1302 gallons, equalling 17·2 gallons per ton.

Quality of Tar.—The tar produced was thin and uniform in consistency, and contained 5 per cent. of water as sampled. Much of this water readily separates on standing; and under ordinary works' conditions of the tar remaining for some time in the wells, this amount would doubtless be decidedly lower.

The analysis of the tar (free from liquor) gave the following figures (specific gravity at 60° = 1·076):

Composition of Tar by Distillation, &c.

	Per Cent. By Volume.	Per Cent. By Weight.
Light oils up to 170° C.	3·8	3·0
Middle oils, 170° to 270° C.	29 6	27·0
Heavy oils, 270° to 350° C.	24·7	23·8
Pitch, above 350° C.	—	45·9
Naphthalene		4·5
Free carbon		2·5

Yield of Ammonia.—The total yield of ammonia, calculated as 10-oz. liquor, amounted to 2960 gallons:

Equalling 39·6 gallons of 10-oz. liquor per ton
,, 33·4 lbs. of sulphate of ammonia per ton.

Yield of Cyanide.—A test of the gas made at the inlet to the washer showed the following:

Cry. sod. ferrocyanide. . . 4·8 lbs. per 10,000 cub. ft.
$Na_4\ FeCy_6\ 10\ H_2O$ . . . 5·5 lbs. per ton.

The quantity of cyanide is therefore quite equal to, or better than, the average obtained from the horizontal retorts.

Sulphur in Gas after Purification with Oxide Only.—A test of the total quantity of sulphur in the gas after purification showed 37·5 grains per 100 cubic feet.

During the whole period of the test, matters proceeded with the utmost regularity, the continuous introduction of the coal into the top of the retorts, and the removal of the coke from the bottom, taking place with great smoothness.

(Signed) HAROLD G. COLMAN.

The Advantages Summarized.

To sum up, the experience derived from the working of the system has so far indicated that the following advantages are obtained by its use:—

(1) Increased make of gas per ton of coal carbonized.
(2) Increased yield of tar per ton of coal carbonized.
(3) Increased production of ammonia per ton of coal carbonized.
(4) Coke improved and of more value.
(5) No stopped ascension or descension pipes.
(6) Increased make of gas per retort.
(7) Largely increased make of gas on same ground space.
(8) Improved labour conditions, and at considerably reduced cost.
(9) Great economy and saving in first cost of land and buildings.
(10) Reduced wear and tear on retorts.

Future Extensions.

Owing to the saving in space that can be effected with vertical retorts, the system will enable a large extension of the carbonizing plant to be made within the boundary of the land now belonging to the Gas Estate. An additional machine-charged horizontal retort-house would be out of the question; and the present retort-house, with horizontal retorts charged and discharged by West's manual machinery, cannot be extended. If the plan is referred to, a projected extension on the vertical system will be seen. The site represents the little remaining property, within the public roads surrounding the works, belonging to the Gas Department. This is now occupied by the old plunge baths of the town and other buildings. But it will be sufficient to enable an extension of the carbonizing plant to be made on the vertical system; and thus the necessity of going to another site (already secured) will be deferred, as well as the consequent large expenditure. The extension of the verticals contemplates eight settings of eights; and, as the present setting is regularly dealing with 20 tons a day of local slack, the new bench would represent an additional carbonizing capacity of 160 tons of the same class of coal.

It only remains to congratulate Messrs. Glover and West on the success that has attended their efforts at producing a simple combination for the continuous carbonization of coals in vertical retorts, and West's Gas Improvement Company on the manner in which they have carried out this first installation of eight retorts on the system. Needless to say there has been a great amount of anxiety on their part as to the success of the venture, in view of the conditions attaching to the contract. Had failure to come up to the guarantees been the result of their enterprise, the financial loss would, of course, have been very considerable. Fortunately, the end has been the one desired; and there is no doubt that the personal interest Mr. West, sen., has, in conjunction with Mr. Glover, taken in the development of each detail has had much to do with the success of the complete system, of which it has been our privilege to make such minute examination.

A FEW NOTES ON THE ST. HELENS GAS-WORKS.

While on the St. Helens Gas-Works investigating the new continuous setting of verticals, a few notes were made as to the conditions of working there which (while not attempting to describe the plant as a whole) will certainly form a useful supplement to the foregoing.

The works as they now stand are the results of reconstructions and enlargements on an extension of the original site. They have been reconstructed three times since they were purchased from the St. Helens Gas Company in 1875. The existing arrangement of the plant is such as leads to an orderly succession of operations. The coal is received on sidings connected with the London and North-Western Railway, and is brought in from the main line by the Corporation's own locomotives. The coals used (as mentioned in the foregoing) are the cheapest forms of slacks from the local coals, thereby setting up a cheap base to the whole operations. Enrichment is by oil gas; the Peebles process having been continuously at work since its introduction, with the exception of the summer months, during which enrichment is by crude naphtha obtained at the works' own tar distillery. Seeing that coke and the other products are here so successfully worked-up—the resultant coke being especially an important feature—the highest production of gas per ton of coal is not so essential as it is in some works. Last financial year the total quantity of gas made was 465,252,000 cubic feet; and the total amount of material used in the manufacture of gas, including coal, cannel, and oil, was 46,452 tons, of which 438 tons were cannel nuts. The oil used was 89 tons 14¼ cwt.; but of the total gas made, only 2,084,030 cubic feet represented oil gas, or 0·04 per cent. The illuminating power of the gas supplied was equal to 17·79 candles. The make per ton of total material used (including enrichment) was as the figures show, 9971 cubic feet. But of the character of the bulk of the material used, sight must not be lost; nor must this point be overlooked, that in the last financial year the total income from the bye-products was £21,639 net, which is believed to be the highest percentage of income recovered from bye-products in the country—at any rate it is more than the cost of the coal and the oil for enrichment put together. As a matter of fact, the cost of coal, &c., equalled last year 10·46d. per 1000 cubic feet of gas sold; while the income from residuals was equivalent to 11·08d. per 1000 cubic feet of gas sold. The total received from residuals deducted from the total cost of manufacture leaves the cost of gas into the holders at 6·8d. per 1000 cubic feet. In other words, the cost of gas into the holder (including maintenance of works and salaries) was equal to £13,191; and as the gas made was 465,252,000 cubic feet, this equals 6·80d. per 1000 cubic feet. The cost of distribution was £2823, or equal to 1·45d. per 1000 cubic feet of gas made. The quantity of coke for sale was 26,347 tons, which was equal to 11·34 cwt. per ton of coal carbonized. The tar made was 2270 tons, or 8·7 gallons per ton of coal. The sulphate of ammonia made was 578 tons 2 cwt., or 27·87 lbs. per ton of coal. It may be added that the gross income from gas last financial year was £49,648; or, deducting discounts (£2546), the net income from gas was £47,102.

Passing into the old retort-house, it is seen to contain 24 beds of seven retorts, 22 in. by 15½ in. by 20 ft., operated by West's manual machinery. Upon inspecting the charges and heats, the latter are found to be good, and the former even, and thoroughly well carbonized. Another thing was observed—that Mr. Glover aims at having moist mouthpieces. To this end, he has extended the ascension-pipes to the middle and upper retorts, so as to have the ascensions of uniform length, and give on the mouthpiece side a uniform condensing area, which is very useful in preventing stopped ascension-pipes. The settings are heated by the gaseous firing system so successfully introduced by Mr. Charles Carpenter, by means of producers heating more than one bed apiece—three beds being the maximum at St. Helens. The combustion chambers are thoroughly under control, and an evenly heated retort—the heat being that which Mr. Glover's experience shows him is the best for the kind of coal carbonized—throughout, with a reduction just at the mouthpiece, is obtained. In each of the small arches permissible in this retort-house, seven retorts are set; and so even is the heating and working, that records of from 1200 to 1300 working days for the retorts are obtained in general practice, which is considered good for retorts worked by manual machines. Figures as to gas production have already been quoted; and in the latter portion of the section of this article dealing with the vertical retorts, the line of future carbonizing plant extension and working has been predicted.

In the coal-store, at the time of the visit, a delivery of washed slack and dry slack was being dealt with. The two classes are separately delivered, and are mixed together close to the elevator boot, thus enabling a good coke to be obtained, for which there is an excellent market all the year round. In buying coal, Mr. Glover always remembers that he is a coke manufacturer as well as a gas maker; and therefore the coal is not bought specially to get a high production of gas per ton. The purification of the gas from the horizontal retorts is by lime, which when fouled finds a free sale among the farmers of the district. By some inexplicable means, St. Helens has got a name for being away from all agricultural interests; but, as a matter of fact, the town is closely surrounded by an agricultural area, and to this the waste lime goes, with profit to buyer and seller. It should be stated that the Gas Committee are under no compulsion in the matter of eliminating sulphur compounds. Having carefully purified the gas, it is enriched up to from 17 to 18 candle power, which is a little lower than the department has been supplying during previous years; and this is done, notwithstanding that the standard illuminating power is 14 candles, tested by the "London" No. 1 argand burner. Nor, in fact, are the Committee restricted as to impurities; nevertheless their operations are all conducted as if the restrictions were in existence—the Metropolitan Gas Referees' tests being used to check all operations. During the year 24 tests were made for impurities, with the following results: Sulphur, average maximum 12·6 grains per 100 cubic feet, average minimum 10·9 grains, average mean 11·7 grains. The maximum (17·2 grains) was in December, 1908, and the minimum (8·9 grains) in April. As to ammonia, the average maximum was 0·6 grain per 100 cubic feet, minimum 0·4 grain, and mean 0·5 grain. The maximum (0·8 grain) was in June, 1908; and the minimum in January, 1909, 0·3 grain. The average illuminating power (237 tests) was 17·79 candles.

The naphthalene process introduced by Messrs. Young and

Glover has been in continuous use since the year 1897. The crude gas is washed before the scrubbers in suitable oils for the removal of the larger portion of the naphthalene; while to prevent the formation of any crystals at all in the distributing system, a small quantity of suitable oil is vaporized into the trunk mains by a simple piece of apparatus, through which a continuous stream of gas travels (bye-passing the district governor) on its way to the town. The distribution system has been entirely cleared of the naphthalene trouble, which was very bad in St. Helens before the process was invented. Difficulty, it may be said, is now unknown in any part of the distribution system or in consumers' services. It is extraordinary, however, what an amount of naphthalene comes from the cheap coals now used at St. Helens, carbonized at high heats, which is fully revealed upon examining the distillates at the tar-works.

No one would think of visiting the St. Helens Gas-Works in search of information without inspecting the tar-distilling plant, and the methods pursued in recovering the products from the residuals of gas manufacture. On this head, full particulars can be obtained from the paper read by Mr. Glover at the autumn meeting of the Midland Association of Gas Managers in 1906. Among the many interesting features is the one that the enrichment of the gas in the summer time is entirely by the benzol from the crude naphtha obtained from the distillation of the tar. Inasmuch as this enrichment is from one of the products of gas manufacture, it is the cheapest form obtainable.

These few supplementary notes, as intimated earlier, will assist in explaining the character of the operations now carried on at St. Helens, together with the objects Mr. Glover has in view in following the particular lines of practice that he has adopted.

THE LIVESEY MEMORIAL FUND.

We have received from Mr. Walter T. Dunn the following list of further contributions to the fund:—

1909.		£	s.	d.
May 24	Previously acknowledged (subject to correction made in letter, p. 590) .	9793	1	7
,, 25	Cooke, A., Oldbury	1	1	0
,, 27	Dixon, Harold B., F.R.S., Manchester	1	1	0
,, 28	Simmance and Abady, Westminster .	5	5	0
	Warrington Corporation Gas Committee	5	5	0
June 1	Gibson, James, Leigh	1	1	0
,, 2	Belton, J. C., Chester	0	10	6
	Hoyte, P. S., Plymouth	2	2	0
	Musselburgh Gaslight Company . .	5	5	0
	Tetley, C. F., Chairman of the Leeds Corporation Gas Committee . . .	50	0	0
,, 4	James Dougall and Sons, Bonnybridge	5	0	0
,, 5	S. Penny, London	1	0	0
,, 7	Barton, John, Peterborough	1	1	0
	Chard Corporation Gas Committee .	1	1	0
	Onslow, A. W., Woolwich	0	10	6
	Richmond, F. D., Heckmondwike .	0	10	6
	Trewby, L., Mill Hill	1	1	0
	Total	£9874	16	1

PERSONAL.

Mr. W. Fred Vernon, the Manager of the Coupar Angus Gas Company, has been appointed Manager of the Stonehaven Gas Company, in succession to Mr. W. M'Lean Ross, resigned. Mr. Vernon was Assistant Gas Manager at Kelso, his native town. In 1902, he was appointed Manager at Coupar Angus, and while there he has effected considerable improvements in the works.

It will be remembered that early last year Mr. Clement Hovey, who was then the Assistant Engineer and Manager of the Tyneside Gas Company, North Shields, was selected by the Directors of the Union des Gaz for the appointment of Engineer-in-Chief of the Milan Gas-Works, which position carried with it the superintendence of the whole of the technical service there. Mr. Hovey has, we learn, resigned the appointment, and intends returning to England to once more take up a position in home gas engineering, in which he had, before his departure for Italy, secured for himself by his abilities a large measure of recognition. The Directors of the Union des Gaz have expressed their very sincere regret at the coming severance of Mr. Hovey with the Milan works.

At the request of the Directors of the Toronto Gas Company, Mr. Thomas Newbigging will shortly leave England for Canada, to advise them on important extensions of their works.

In the "Journal" for the 25th ult., it was announced that Mr. J. R. H. Jacobs, the Assistant-Secretary and Accountant of the Reading Gas Company, had obtained the appointment of Secretary of the Southampton Gas Company. Mr. Jacobs entered upon his new duties yesterday. He had been with the Reading Gas Company for nearly twenty years; and at the last meeting of the Directors a resolution was passed expressing their high appreciation of his services, and a substantial honorarium was awarded him.

OBITUARY.

CHARLES ALFRED CRAVEN.

An old and respected ex-servant of the Dewsbury Corporation, and one of the few remaining representatives of the past times of the gas industry, was removed last Tuesday by the death, at his residence in Altrincham, in his 69th year, of Mr. Charles Alfred Craven. Deceased was born at Keighley, and at the age of eighteen became a member of the staff of the Dewsbury and Batley Gas Company. While with them, he qualified himself for more responsible duties; and in 1862 he obtained the position of Manager of the Keighley Gas-Works. Not long afterwards, the Manager at Dewsbury (Mr. Williamson Metcalf) retired; and Mr. Craven was invited to become his successor. In view of the extensive improvement scheme he had in hand at Keighley, he at first declined to move; but about four years later he returned to Dewsbury. When in 1873, the undertaking was transferred by agreement to the Corporations of Dewsbury and Batley, Mr. Craven elected to remain with the former, as the necessity for the erection of new works to replace those at Batley Carr would, he thought, afford scope for the exercise of his engineering abilities. He became Engineer and Manager to the Corporation; and to his designs, and under his supervision, the present works at Savile Town were constructed. After holding this position for ten years, he accepted an offer to manage the gas-works at Pernambuco; and he proceeded to Brazil in 1877, accompanied by his wife and children. Two years previously, the management of these works was relinquished by Mr. Thomas Newbigging, who was succeeded by two engineers who were both cut off by yellow fever. This, however, did not deter Mr. Craven from taking up their work; but while he, fortunately, escaped, he sustained a painful bereavement by the death of his eldest son, Mr. Arthur Craven (who he had hoped would succeed him as Manager), who was attacked by the malady and succumbed to it. While abroad he had varied experiences; and for a time things were made exceedingly uncomfortable for him—his life being at times in danger. But he finally won his way to the hearts of his workpeople, who, when he returned to England in 1885, made him a handsome presentation, consisting of a marble timepiece and two large bronze ewers.

On reaching England, Mr. Craven settled for a time at Todmorden, where his brother is in practice as a solicitor. In 1890, however, he was again appointed Manager of the Dewsbury Gas-Works; and continued to serve the Corporation in this capacity up to 1906, when he resigned on account of ill-health, and was succeeded by Mr. G. W. Fligg. A few months after his retirement, he was presented with an illuminated address and a framed photograph by the employees at the works. He was unable to be present on the occasion; but the gifts were conveyed to him by Mr. Fligg on behalf of the donors.

Mr. Craven was one of the first members of the British Association of Gas Managers; and though he could not personally attend the preliminary meeting held in December, 1863, to consider the advisability of forming the Association, he was one of a number of gas managers who sent letters expressing their approval of its objects. He was for some years a member of the Council of the Gas Institute, and in the past took a very active part in its work. He was largely instrumental in bringing about those personal reconciliations which resulted in the amalgamation of the two gas organizations, and the formation of the present Institution, of which he was a member. He was not a paper reader; but at the meeting of the Institute in 1898, he offered some interesting remarks on the inclined retorts he had installed at Dewsbury. His name was one of the earliest on the roll of the Manchester District Institution of Gas Engineers; but it was removed in 1906. He was a Freemason; his Lodge being that of the Three Grand Principles. As a man he was genial and good-hearted, and was highly esteemed by a large number of private and professional friends. He leaves a widow, three daughters, and one son, Mr. Harry Craven, who is Town Clerk of York.

The funeral took place last Friday afternoon, at Sale Cemetery; floral tributes being sent by Alderman Oldroyd (the Chairman of the Gas Committee of the Dewsbury Corporation), Mr. Fligg (the Manager), and Mr. Fred Schofield (the Assistant-Manager). The two latter attended the funeral, with Alderman Pearson and other members of the Gas Committee.

SIR EDWARD LAWRENCE.

On Monday last week, a noted local political leader, and one of the foremost figures in the mercantile and social life of Liverpool, was removed by the death of Sir Edward Lawrence, LL.D., which occurred at his residence, The Grange, St. Michael's-in-the-Hamlet, after a somewhat protracted illness, complicated by weakness of the heart. Deceased, who, our readers may remember, was for many years Chairman of the Liverpool Gas Company, was born in the city on Oct. 4, 1825, and was therefore in his 84th year. His father, who was Mayor of Liverpool in 1845, brought him up to commercial pursuits, for which he displayed great aptitude. He commenced business for himself as an East India merchant, and his firm is still identified with it. He entered public life in 1841, at the time of a great parliamentary contest. His municipal career began in 1860, when he represented the North Toxteth Ward on the City Council. He was Mayor in 1864, and during his year of office had the honour of entertaining the then Prince and Princess of Wales (the present King and

Queen) on their first visit to the city. Deceased joined the Board of the Liverpool Gas Company in 1876, at which time it was the custom to elect the members in rotation to fill the office of Chairman for a period of two years. His turn came in 1881; but at the end of the usual period he was asked by his colleagues to consent to re-nomination. He complied with the request, and was re-elected every year till the annual meeting in August, 1904, when he expressed his desire to relinquish the position. His resignation was accepted regretfully; and he was succeeded by Mr. Wade Deacon. He was a Director of the Bank of British West Africa, of the New Incandescent (Sunlight Patent) Gas Lighting Company, Limited, of the Liverpool Overhead Railway Company, and of other undertakings. He was elected an Alderman in 1892, and held many positions of trust in the city. His father was one of the founders of Liverpool College; and Sir Edward was appointed Pro-Chancellor of the University of Liverpool—the degree of LL.D. being conferred upon him two years ago in further acknowledgment of his services. In 1899, he received the honour of knighthood in recognition of his public activity and his labours on behalf of the Conservative party. Deceased leaves two sons and a daughter. The funeral service took place at St. Paul's, Prince's Park, on Thursday, after which the body was cremated. The Gas Company were represented by Mr. H. Wade Deacon (Chairman) and several Directors, Messrs. William King and Edward Allen (late and present Engineers), Mr. Theodore Garnett (representing Mr. P. F. Garnett, the Secretary), Mr. J. H. Fisher (Audit Department), and others.

JOHN SPENCER PHILLIPS.

We regret to record the death, on Monday last week, in his sixty-second year, of Mr. John Spencer Phillips, The Mount, Shrewsbury, Chairman of Lloyds Bank and of the Shrewsbury Gaslight Company, and one of the best known bankers in the kingdom. Deceased was apparently hale and vigorous only about a fortnight before his death; but it was recognized that the illness with which he was seized would terminate fatally. Mr. Spencer Phillips was the eldest son of the late Rev. John Phillips, the Rector of Ludlow. He was educated at the Shrewsbury School, from which he went to Trinity College, Cambridge, where he took his degree in the Law Tripos. On leaving the University, he became a partner in the private bank of Messrs. Beck and Co., of Shrewsbury and Welshpool. In 1880, he arranged the sale of the concern to Lloyds Bank, and thereafter was connected with the negotiations for the purchase of private banking businesses in various parts of the country. He was elected a Director of Lloyds, afterwards became Deputy-Chairman, and later (in 1897) Chairman. For his eminent services to the bank, the Directors recently presented him with his portrait in oils; and it is among the pictures shown at the Royal Academy this year. Mr. Spencer Phillips was appointed a Director of the Shrewsbury Gas Company towards the end of 1880, and was made Deputy-Chairman on Oct. 28, 1891, and Chairman about two years later. This position he held at the time of his death. He took great interest in the affairs of the Company, and he will be difficult to replace, on account of his high standing and abilities. He was associated with other undertakings; being a Director of the Alliance Assurance Company (Chairman of the local Board) and Deputy-Chairman of the North Staffordshire Railway Company. He was a Justice of the Peace for Shrewsbury, but never took his seat; and beyond his commercial activities, he took no part in the public life of the borough. Referring to his death, "The Times," in their Money Article on Wednesday testified to the general regret expressed in banking circles concerning the death of Mr. Spencer Phillips, whose influence was, he said, strongly on the side of harmonious working and good feeling among bankers; and from this point of view he would be missed by the whole banking community. The funeral took place at Shrewsbury last Wednesday, and was very largely attended. Among the mourners were the following representatives of the Gas Company: Mr. T. Frank Poole (Deputy-Chairman), Messrs. J. B. Lloyd and Henry Wade (Directors), and Mr. W. Belton (Engineer and Secretary).

Mr. Henry Oldfield, the Chairman of the Hyde Gas Company, died recently at the age of 65. He had been ailing for a considerable period.

The death occurred recently of Mr. Frederick Bridges, a Director of the Ascot, Hungerford, and Whitchurch Gas Companies. Deceased was in his 68th year.

The death occurred on Friday, the 28th ult., in his 41st year, of Mr. Thomas Riley, the Chief Clerk in the Town Clerk's department of the Bolton Corporation. Deceased was not only a well-known public official in Bolton, but was highly esteemed in local social circles for his genial qualities. The funeral took place at Tonge Cemetery last Tuesday.

We much regret to record the sudden death, last Friday, of Mr. George Cutler, the Engineer and Manager of the Stroud Gas Company. He joined the British Association of Gas Managers in 1872, when he was Manager of the Whitehaven Gas-Works; and he obtained the appointment at Stroud about ten years later. He passed into the Gas Institute, and was a member of the present Institution. He was a gentleman of the old school—his bearing being such as to endear him to all with whom he was associated; and he will be greatly missed by a large number of friends.

A CHANGE OF ADDRESS AND OF DIRECTORS.

Has 99, Cannon Street dropped into disfavour? And have the names of Eaton and some of his satellites lost the moderate power of attraction they at one time possessed; or are they suffering from ill-health, and cannot attend to company promoting, or what is the matter? We should not like them to slip from sight, in view of the publicity they have had in the past, without knowing whether it is our duty to commiserate with, or to congratulate, them. Our interest in these matters is aroused by the issue of a fresh prospectus of the Water and Gas Debenture and Share Investment Trust, Limited, inviting further applications for capital, and which invitation we cannot strain our consciences to support. There was a prospectus issued dated March 9, 1908; while the present one is dated June 5 this year. The Directors were:

March 9, 1908.	June 5, 1909.
Dr. Allan Maclean (Barrister-at-Law), *Chairman*.	Sir W. W. Bruce, Bart.
H. W. L. Way, *Vice-Chairman*.	H. W. L. Way, J.P.
Percy Davies.	Sir C. B. H. Soame, Bart., Solicitor (*Chairman*).
A. Schofield.	Capt. F. Jenkins, D.S.O.
E. Eaton.	
Capt. F. Jenkins, D.S.O.	

The new Chairman will be recognized as having had some connection with two recent Welsh gas promotions—Gowerton and Beaufort. The other "Bart."—Sir W. W. Bruce—is a fresh importation. It is wondered whether his name will prove more magnetic than that of the other Baronet. Apparently, it is hoped so, or it would not appear in the prospectus before the name of the Chairman. In March, 1908, Mr. J. Kennard was the General Manager of the Trust. His name does not appear on the face of the fresh prospectus. Percy Williams was the Secretary in March, 1908; he is so now. The office at the former date was 99, Cannon Street; it is now a few doors off—viz., 2, Budge Row, Cannon Street. Now, why has the "Trust" shifted from the notorious 99, Cannon Street? Has the office accommodation there got too limited for the amount of the work to be done?

In March, 1908, the invitation graciously issued to the public was to subscribe for 10,000 6 per cent. preference shares of £1 each at par, and 10,000 10 per cent. ordinary shares of £1 each at par. Up to that time the total original share capital amounted to £2000! The public then showed the measure of their "trust" by declining to subscribe for anything more than a few hundreds of either class of shares, the big dividends foreshadowed notwithstanding. Prior to that issue, the capital stood at 1000 preference shares, 800 ordinary shares, and 200 founders' shares. Subsequent to the invitation of March last year, only a further 835 ordinary and 865 preference shares were added (although 20,000 shares in all were offered); and of those 835 and 865, 272 of each kind were allotted otherwise than for cash to creditors for accounts owing. This does not look very flourishing. Less than £300 per annum (we make out) would cover the full dividends on the total capital so far issued; so that, when these figures are considered, there is not much to boast about that the "Trust" have been able to pay the "full dividends" for two-and-a-half years. We see that the founders' shares are to take anything left after paying 6 per cent. on the preference shares and 10 per cent. on the ordinary shares (non-cumulative). At the top of the green (suitable colour) application form issued with the prospectus in March, 1908, it was stated: "The Directors will make the next issue of shares at a premium, and allottees of the present issue will be entitled to allotment thereof at par." The Directors are keeping faith with the public in respect of the ordinary shares. The preferences now offered (4000) are at par; the ordinaries (also 4000) at 2s. premium—if the Directors can get it.

There are certain things in the prospectus with which we agree, but which have a very remote application to the promotions which the founders of the Water and Gas Debenture and Share Investment Trust, Limited, have had anything to do with at the old address at 99, Cannon Street. If we omit the words "and electric light" from this paragraph, there is no objection to it:

> As a channel of investment, combining security with reasonable return, there is probably no branch of joint-stock enterprise which commands more favourable attention than the shares of well-managed gas, water, and electric light companies.

But we demur to the succeeding half-a-dozen words of the paragraph, when applied to the undertakings that have had birth at 99, Cannon Street:

> Especially those in the progressive stage, in which case the shares thereof have not generally reached a premium.

The last clause of the paragraph is quite true of the 99, Cannon Street promotions. Then the prospectus proceeds to point out with beautiful *naïveté*:

> There are numerous cases of the purchase of water and gas undertakings by local authorities, for which high premiums have been obtained by the shareholders.

And we have an instance:

> In the case of the London Water Companies on their transfers to the Metropolitan Water Board, the difference between the nominal value of the shares and the sum paid as purchase money amounted to nearly twenty millions sterling.

On the outside of the prospectus, examples of companies that

have "already" arrived at the premium stage are given. Among the water companies are Brompton and Chatham, Lewes, and Portsmouth; and among the gas companies Bath, Bromley, and Cardiff. It may be suggested to the "Trust," that they expunge from this list all the companies that had existence, and had "already" arrived at a premium stage, before Mr. Eaton entered upon his gas and water promoting campaign, and confine the list to the promotions of 99, Cannon Street, that have (if any can be found) actually reached the premium stage. One other point from the prospectus. We see the Directors have protected themselves against the applications for shares being of a small order. That is wise. "The minimum subscription upon which the Directors may proceed to allotment of shares on this issue has been fixed at £20!" The prospectus is signed by W. W. Bruce, Bart., and H. W. L. Way (Directors). Why did not the Chairman, Sir C. B. H. Soame, Bart., sign it?

If the prospectus does not attract applications for shares, perhaps the covering letter signed by "P. Williams, Secretary," will do so. When a Water and Gas Debenture and Share Investment Trust, Limited, have to descend to the offer of inducements of this sort, they must be in a bad way indeed. P. Williams in his letter says:

> I would mention that the shareholders are entitled to the following privileges:
> (1) To have their investments purchased and sold without charge by us.
> (2) To an allowance of 3s. in the pound off the usual annual premiums payable on fire policies on house property, furniture, &c. Such allowance to be made every year.
> (3) To have investments insured against reduction in dividend and depreciation in capital by payment of a premium to be agreed.

The temptations offered by Nos. 1 and 2 are beautiful and cheap-jack like in their simplicity; and as to No. 3, we shall be pleased to publish a list of the premiums that would be charged in respect of the various companies promoted by 99, Cannon Street, not omitting Gowerton and Beaufort, in which Sir C. B. H. Soame, Bart., Chairman of the Trust, was concerned.

INSPECTION OF GAS AND METERS.*

The work before us does not aim at giving a description of the manufacture and distribution of gas, but merely at supplying information on the methods, apparatus, and chemicals used in America in the testing of gas—rather from the inspector's or examiner's standpoint than from that of the gas-works' manager or chemist.

The first part (comprising 80 pages) deals with photometry. Incidentally, the author observes that the table-photometer as now prescribed by the Gas Referees is not generally considered in the United States to be equal to the bar-photometer in accuracy and ease of manipulation. The bar-photometers in common use are either of the closed bar or improved Letheby type. A form of portable photometer is described; and apparently the author considers it a valuable item in the equipment of the State Inspector of Gas, notwithstanding the evidence of the American Gas Institute to the contrary.

In regard to the loss of illuminating power which results from the passage of gas through rubber tubing, it is remarked that "such loss is by no means confined to old samples of tubing, for several lengths of new and expensive rubber hose showed a similar loss." The common belief is rather that the loss decreases, up to a point, with the time during which the tubing is kept in use for gas, and that fresh tubing has a most disastrous depreciating effect on the illuminating power of gas. This view is supported by reason as well as the results of observation; and we wonder whether the author has any real evidence against it. The point, however, is of minor importance, as flexible metallic tubing has now superseded rubber tubing even for portable photometer connections. The author prefers the Leeson contrast-disc to the Bunsen disc; and he rightly says that the Lummer-Brodhun device is fatiguing to the eye.

Six standards of light are referred to—viz., the Harcourt, Carcel, Hefner, and Elliott lamps, the Edgerton slit (an improved screen of the Methven type), and candles. The Elliott lamp and Edgerton slit, which are both of American origin and practically unknown in this country, are spoken of as suitable for works' use in cases where the more accurate standards are not essential and would be less convenient on account of the special fuels which they consume and the more precise and tedious adjustments which they require. The Harcourt lamp of the standard English type is now made, with a few modifications, by an American firm. Curiously, the price of it, as quoted by Mr. Stone, is almost precisely double that of the English-made lamp; but probably an import duty is imposed on the latter to equalize the price to the user in the United States. On the other hand, pentane is naturally somewhat cheaper in the country of origin of its raw material.

In regard to the standard gas-burner, the author appears to favour the general adoption of the No. 2 "Metropolitan" argand for coal-gas supplies; but he points out that in Massachusetts this burner has been ruled to be impracticable for use by consumers, on the ground that, on account of its high cost, it is not within the reach of everyone.

Part II. of the book occupies about 110 pages, and refers to chemical tests. Most of the methods of testing described are familiar to English gas chemists. There is a somewhat inconclusive discussion of the question of the statutory limitation of the amount of sulphur which may be permitted in the gas supplied to consumers. Part III. treats of calorimetry, specific gravity, and pressure. It comprises about 70 pages. The relative merits of the Junkers and Boys calorimeters are discussed on the basis of the recent report on calorimetry of the Committee of the American Gas Institute; and to this report the author appears to have little to add of his own knowledge. The fourth part of the work, covering 30 pages, refers to the testing of meters, and contains no matter of special interest. There is an appendix of some 20 pages of useful tables.

We think the work under review should be useful to the gas-testing enthusiast of every nationality, and in particular to the gas inspector of any of the several States of the Union in the North American continent. Indirectly it may be of value also to the gas-works chemist there, while it will provide the gas examining fraternity in European countries with an incentive to study more closely the conditions with which their *confrères* on the staffs of gas undertakings are expected to comply in their daily routine of gas supply for the benefit of the community at large.

* "Practical Testing of Gas and Gas-Meters." By C. H. Stone, B.S., M.S., Chief Inspector of Gas Public Service Commission, Second District, New York, Member American Chemical Society. New York: John Wiley and Sons. London: Chapman and Hall. 1909.

THE ILLUMINATING ENGINEERING SOCIETY.

From an account of the proceedings which appears in the current number of the "Illuminating Engineer," we learn that on the 25th ult. a meeting was held at St. Bride Institute, E.C., of those interested in the formation of an Illuminating Engineering Society. At an inaugural dinner held in February last, it was decided to form such a Society; and an Executive Committee was then appointed to consider the drafting of the rules, &c. The Committee reported at the meeting on the 25th ult., when the constitution and bye-laws drafted by them were ratified by those present; and the Committee (forming the nucleus of the first Council of the Society) were re-appointed with the power of adding to their number as might be expedient, in order that they might proceed with the affairs of the Society during the summer vacation. It was decided that the Committee should approach a number of gentlemen whose names were approved by the meeting, with a view to their being invited to act as officers or on the Council; and it was also agreed that the Council should be free to elect as members any who intimated their desire to become members of the Society, and were duly proposed and seconded in the prescribed manner, without the formality of ballot—up to the beginning of the first session of the Society.

Mr. Leon Gaster, the Hon. Secretary, on being called upon to present his report, said that, though the members of the Committee represented different interests and various aspects of illumination, they had worked together in perfect harmony; and the keen discussions which had taken place at the meetings had invariably been of an amicable nature. This, he thought, only illustrated what he had always maintained—that people with a common interest in illumination, though connected with different branches of the subject, could work together perfectly satisfactorily for the common good. A large number of gentlemen had expressed regret at being unable to attend; and he had received many expressions of goodwill to the Society. In no single case had he met with any expression of disapproval.

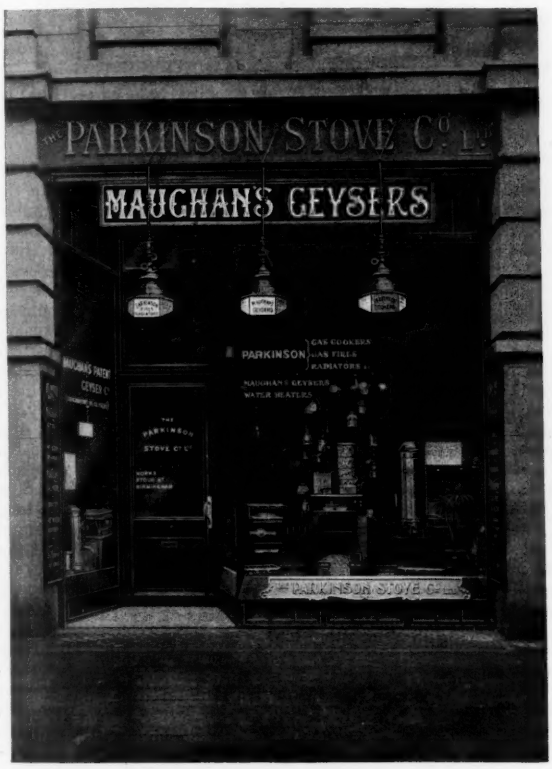
Further particulars, and forms of application for membership, may, on application, by letter, be obtained from Mr. Gaster, at No. 32, Victoria Street, S.W.

In view of the increasing use of reinforced concrete in building construction, the attention of our readers may be called to a pamphlet, entitled "Simplified Methods of Calculating Reinforced Concrete Beams," by Mr. W. Noble Twelvetrees, which has just been published by Messrs. Whittaker and Co., of White Hart Street, Paternoster Square, E.C., at the price of 6d. net. The author is an authority on the special kind of construction dealt with; and his object in writing the book is to remove an existing difficulty arising from the differing notation and algebraical forms in which various authorities have been in the habit of expressing their equations.

We have received the first number of the "Canadian Heating and Lighting Journal," which will be devoted to the industries indicated in the title as well as that of metalware. It is being conducted by Messrs. John A. Fullerton and George H. Honsberger, both of whom were connected with one of the largest trade journal houses in Canada; and in their introductory article they say they have secured the co-operation of experts who will contribute practical articles which will have a "dollar and cents" value to their readers in their every-day work. The sections devoted to the lighting trade, electric lighting, and gas and acetylene are anything but extensive—consisting of only two pages each. The price of the publication, which will be issued monthly in Toronto, is $1 per annum.

PARKINSON STOVE COMPANY'S SHOW-ROOMS.

A DESCRIPTION which appeared in the "JOURNAL" for Dec. 8 last (p. 684) of the new London offices and show-rooms of the Parkinson Stove Company, Limited, was prefaced by the remark that both the rooms and their contents were deserving of favourable notice. Such notice was then accorded to them; but it was not at the time possible to include an illustration of the premises. We are now in a position to supply this omission; and in doing so, would remark that the Company have lately appointed Mr. Sydney A. Scrivener to act as Representative and Manager for the London area. This step has been necessitated by the fact that Mr. T. E. Barralet, the present London Manager, who was formerly Managing-Director of Maughan's Patent Geyser Company (which Company is now incorporated with the Parkinson Stove Company), is, owing to the growth of the water-heating section of the business, going to Birmingham, where the manufacture of the articles is carried on.



The Parkinson Stove Company's London Show-Rooms.

The show-rooms are at No. 129, High Holborn, W.C.; and for the convenience of intending visitors during Gas Institution week, it may be pointed out that they are situated near Kingsway, and adjoining the British Museum Station of the Central London Railway. They consist of lofty ground floor and lower ground floor accommodation, and are, of course, replete with up-to-date apparatus for warming and cooking by gas, as well as for the supply of hot water. In addition, the firm have, in their capacity as agents for the Gaslight and Coke Company, a representative display of attractive gas-fittings. These are to be seen on both floors; but a special feature on the lower ground floor is the controlling of all the lights by means of pneumatic switches.

The firm's specialities on view were fully noticed in the earlier description of the show-rooms already alluded to. Passing reference may, however, be made here to the new "Holborn" intermediate grade cooker, which a number of gas companies are now putting out on the hire system; it being a good and substantial article, and at the same time moderate in cost. It is made in three sizes, with all parts interchangeable and the burners removable for cleaning; and the oven is fitted with self-locking grids, and sliding meat-hook operated from the outside. The oven is packed and lined with green enamelled steel sheets, which are entirely free from screws. In the way of water-heaters, two new and cheap patterns may be mentioned—the "Jewel" geyser and the "Treasure" geyser. Both are made of strong copper, with the exterior polished and lacquered. The former is of the direct heating type, and is intended to supply hot water for bath use only; while the latter is of the chamber-heating pattern, and delivers water suitable for drinking purposes at any temperature up to boiling. They can be had with interlocking taps, to prevent the gas being on when the cold water tap is turned off.

The show-rooms contain samples of practically everything in which the Company deal; but the large amount of space at disposal obviates anything like an unduly crowded appearance of the goods.

A DISPLAY OF MODERN GAS-FITTINGS.

Messrs. G. Hands and Co.'s New Show-Room.

THE motto of "Artistic Fittings at a Moderate Price" must be acknowledged to be a good one to adopt—and to live up to. Most people are more exacting in their requirements than used to be the case; and the gas consumer is, generally speaking, no exception to this rule. In regard to lighting, a great deal more is now expected in the way of attractiveness of the fittings; and enterprising firms have set themselves to meet this growing demand—nay, more, to still further stimulate it, by the designing of goods of ever-increasing beauty. Among the foremost of the firms who have done so much to deserve the thanks of the gas industry in connection with this transformation of the utilitarian fitting into a thing of beauty which is a joy for ever, must be mentioned Messrs. G. Hands and Co., of No. 71, Farringdon Road, E.C. The wares of Messrs. Hands and Co., both in general and in particular, have been referred to at length in previous volumes of the "JOURNAL;" but a recent extension of their show-room accommodation afforded a welcome excuse for a further inspection by a representative a few days ago, and mention must be made of what was seen there.

Instead of both offices and show-room being situated on the ground floor of the premises, as was previously the case, the offices have now been removed to the first floor; and this, of course, has rendered available much additional space for display purposes. Immediately on entering this enlarged room, one is struck by the complete manner in which the decoration harmonizes with the fittings. The several shades of light green of which the colour scheme consists (with a large amount of white enamel) show off to the greatest advantage the many hundreds of lovely fittings of all kinds, shapes, and sizes which cover the walls and hang in thick clusters from the ceiling. The choice is naturally bewildering, when a glance is cast over the contents of the whole room; but on closer inspection, it is noticed that the fittings are conveniently grouped for selection of any particular kind. The whole of the lights in the place are controlled on the well-known "Norwich" system, the smooth and reliable working of which—as well as its simplicity—can be demonstrated by the operation of one switch after another right round the room. It may be remarked that the valve in connection with the "Norwich" distance lighting arrangement has been reconstructed, with the object of rendering any complications whatever a matter of impossibility. The position of the bye-pass tube has been altered, so that the jet burns upright just underneath the burner. It used to be at the side; but it was found that there was then apt to be rather too much of an explosion on lighting up, with the result that the bye-pass light was occasionally blown out. Now it can be seen that there is no explosion at all.

Three-Light "Ipswich" Oxidized Copper Bracket.

Turning to the fittings which adorn the walls, attention will probably in the first place be attracted by the beautiful shades of colouring to be seen in the oxidized copper goods. The explanation of this is that they are hand-wrought; it not being possible to obtain such effects with cast work. Messrs. Hands and Co. claim to have been really the first people to introduce the use of oxidized copper for gas-fittings. But whether this is so or not, anyone can see for himself that they have brought to a very high state of perfection indeed the adaptation of this metal for the purposes of what they so justly name their "Modern Art Gas-Fittings." After a visit to these show-rooms, no unbiassed person would deny that an installation of gas lighting can (with the facilities that are already available) be carried out in at least as artistic a manner as could be accomplished by the best efforts of any other system of illumination. In another direction, mention may be, made of a handsome panel of Louis XVI. brackets, designed specially for use in large houses. These, of course, are brass heavily gilt.

Suspended from the ceiling are a number of shaded dining-room pendants finished in polished brass or oxidized copper. They

are arranged for one or two lights, and have silk flounces of different colours, but all lined with white. A large demand is being experienced from gas companies for fittings in this style; and they are certainly deserving of popularity—both on account of their artistic merit and of their moderate price. And this latter clause brings one to the second part of the motto with which this notice opened, and which Messrs. Hands and Co. place before themselves in the conduct of their business—"Artistic Fittings at a Moderate Price." Enough has been said (in conjunction with the illustrations) as to the artistic nature of the goods; but a word or two should be added on the matter of price. For a very few shillings, it is possible to get a single bracket that would not look out of place on the wall of any small house; while for a three or four light modern-antique pendant, in oxidized copper, with insertions of enamels, one may give more than as many pounds. Both the cottage and the mansion are catered for; but however simple, and consequently small priced, a fitting may be, inspection shows that it is just as well made as its more expensive brother. "Cheap and nasty" is a term that does not apply to any of the things to be seen in these show-rooms—low priced as a great many of them are. Before leaving this attractive display of fittings, reference may be briefly made to a very inexpensive, and at the same time extremely elegant, type of hall or lobby light, in which the decoration is attached to the shade holder of the Hands "Cool" burner. The object in designing this style of pendant has been to meet the want of a fitting of the kind that can be purchased, with burner complete, at a moderate figure, and at the same time be worthy of being placed in the prominent position

The "Hastings" Brass or Oxidized Copper Corona Pendant.

An Inexpensive Hall Pendant, with Hands "Cool" Burner.

which a hall light is necessarily called upon to occupy. These pendants are, of course, also suitable for placing in rooms over which an equal distribution of light is specially desired. They can be had in a number of different patterns.

The Hands patent "Cool" inverted burner, just referred to, has already been described in the "JOURNAL" for Nov. 24, 1908 (p. 554); and it is only necessary to say here that two distinct advantages are claimed for it. The first of these is that it is always cool for adjustment of either air or gas; and the second is that it will not cause discoloration of the fittings on which it is used. In fact, the makers go so far as to undertake to re-oxidize or re-lacquer any fitting which can be genuinely urged to have been discoloured by the Hands burner. This is a guarantee which says a good deal for their faith in the invention. In the show-room the burners are to be seen in action fitted to polished brackets, so that visitors may receive optical proof of the absence of discoloration. These burners are being largely taken up by some of the big gas companies. Tests, it may be mentioned, have shown a lighting efficiency of 81 candles for a consumption of 3 cubic feet of gas. The burner is entirely British made; and a neat appearance is given to it by the fact that the wings which act as deflectors are made of china.

Any gas engineers who should call and inspect the show-rooms during the Institution week will find fitted up outside one of the Hands "Dreadnought" three-burner lamps, operated by a switch, and giving a light of 125 candles per burner with a consumption of 3 cubic feet of gas per burner per hour. The lamp is detachable in such a way as to make the working parts very easily

The Hands "Cool" Burner.

accessible. This type of outside lamp is forcing its way to the front, though perhaps it is not yet so much in the public mind as its namesakes in the Navy. At the present time a section of an arcade in one of our large cities is being illuminated by these lamps in place of arc lights. Six arc lamps are being removed, and replaced by five-light "Dreadnoughts," which will, it is calculated, give the same amount of light at a very much smaller cost. If this trial should prove successful—and there is no reason to anticipate that it will not do so—we shall hear of further demands for "Dreadnoughts" from the town referred to. Installations are also anticipated in some of the skating-rinks which are springing up with mushroom-like rapidity all over the country.

The business of Messrs. Hands and Co. is still a young one, having been started only some six years ago; but it has already, in its short career, achieved solid and growing success, the reason for which is ascribed by the head of the firm to the motto quoted in the first line of this article. It is safe to prophesy that, so long as the aim of supplying artistic fittings at a moderate price is pursued, the firm will continue to find themselves treading the path of success.

Precautions in Laying Pipes in Earthquake Districts.

The March "Bulletin" of the Société des Ingénieurs Civils of France is almost entirely devoted to the consideration of questions relating to earthquakes. M. Bergeron has a theoretical paper on vibrations of the ground and their consequences; M. Espitallier considers the constructional aspect of the matter; and M. Flament-Hennebique contributes an article on reinforced concrete (*béton armé*) and earthquakes, giving a score of interesting photographs of the recent disasters at San Francisco and Messina, which show how well reinforced concrete building stood unmoved in the centre of districts entirely destroyed. A system of architecture suitable for volcanic countries is described and illustrated by M. Pillet; and there is a further paper on a similar subject by M. Pesce. The last-named paper has a note about the precautions to be taken in such countries with regard to mains and inside pipes. The author recommends, as a precaution against fires and floodings resulting from shocks, that interior pipes should have supplementary lengths, so as to give to them a flexibility and an elasticity that would enable them to be stretched or displaced without inconvenience. Under the effect of shocks, special flange rings would allow the piping to be extended without breaking. As regards large outdoor mains, it is suggested that they should be fitted at certain distances with an arrangement permitting of a telescopic lengthening of the pipes and with some kind of spherical knee-cap joint.

Increases in Salary.—The Briton Ferry Urban District Council have increased the salary of Mr. John Mogford, the Gas Manager, by £50 per annum, on the understanding that he is to attend to the electric lighting undertaking. The Stoke-on-Trent Town Council have decided to increase the salary of the Gas Engineer and Manager (Mr. W. Prince) by £50 per annum.

Painting Cement.—The painting of cement has always proved troublesome to builders. Hitherto the best results have been obtained by the judicious use of acids. Two coats of hydrochloric acid and water should be applied to the cement, with an interval of two days between each application. Before painting, care must be taken to wipe off the frothy efflorescences and the globules remaining on the surface. After each operation, when the cement is quite dry, oil paint can be applied. An old process was, after the cement had been cleaned as described, to apply one or two coats of yellow wax dissolved in spirits of turpentine. When this is dry, oil paint may be put on; care being taken to make the first coat very thin, so that it will sink into the cement.

BROOKE AND DEMPSTER'S VERTICAL RETORTS.

Among the patent specifications issued last week, was one relating to application No. 16,405 (dated Aug. 4, 1908), for "Improvements in Connection with Vertical Retorts," taken out in the names of Reuben Mitchell Brooke, of West Vale, near Halifax, and Robert Dempster and Sons, Limited, of Elland. The invention consists mainly in an adaptation to vertical retorts of the principle underlying the prior invention of Mr. Brooke (No. 14,637 of 1906). This principle was "that the heat applied to each of the heating chambers or compartments into which the setting is usually divided, and the draught upon each of such compartments, should be capable of separate regulation." A full illustrated description of the earlier patent appeared in the "Journal" for July 16, 1907, p. 172; and the modification will now be dealt with.

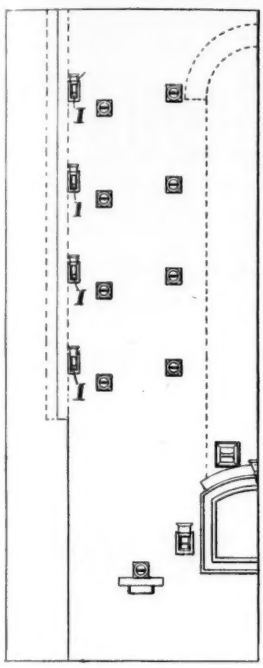


Fig. 1.

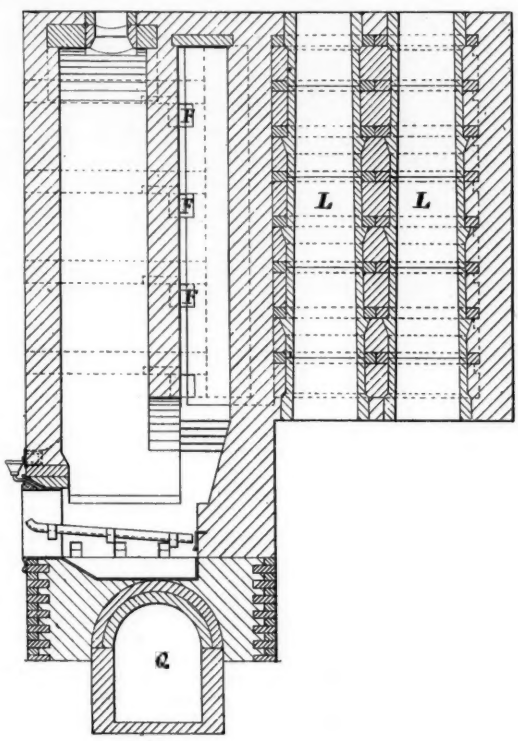


Fig. 2.

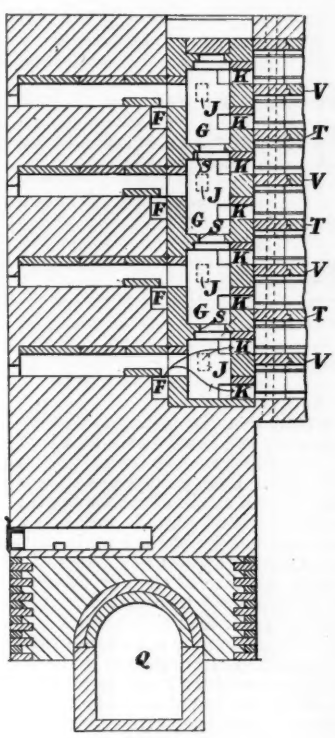


Fig. 3.

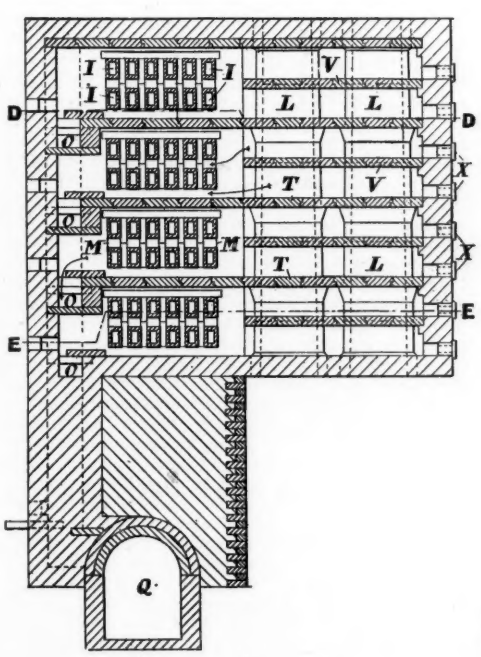


Fig. 4.

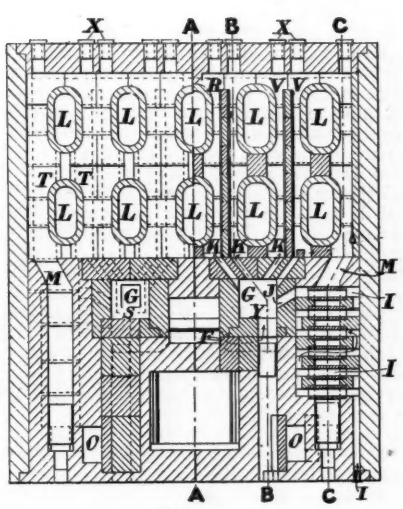


Fig. 5.

The patentees point out that, as dampers close to the different compartments—that is, between the compartments and the regenerator—would be liable to become immovable in consequence of the heat to which they would be exposed, they prefer to regulate the draught by dividing the regenerator into separate units—one for each compartment; and to regulate by suitable dampers at the outlets of each of the regenerators the proportionate draught upon each compartment. The general draught upon the setting would be regulated by a main damper controlling the common outlet from all the regenerators to the chimney. These dampers are, therefore, only exposed to the waste gases after a portion of the heat has been imparted to the secondary air in passing through the regenerators.

In a vertical combustion chamber, they point out, it is conceivable that the tendency of the hot gases to rise might cause the upper compartments of the setting to receive an undue proportion of such gases; but the regulated draught upon each compartment is designed to prevent this. Otherwise, any of the following arrangements might be employed: (1) The supplies of producer gas and secondary air opposite the upper compartment or compartments might be reduced in order to compensate for the surplus rising from lower levels. (2) The supplies might be reduced at the lower compartments, giving a reduced pressure or partial vacuum, inducing a down-draught which would oppose such upward tendency; or the equivalent might be adopted of increasing the chimney draught on the lower compartments. (3) The openings from the combustion chamber into the several

compartments of the setting might be of different sizes, as, for instance, they could be smaller for the upper compartment or compartments, relatively to those leading into the lower compartments. (4) The combustion chamber might be divided into a number of separate combustion chambers, one opposite each compartment of the setting (an arrangement previously known in connection with horizontal retorts), or the combustion chamber might be divided into two or more parts, each part being common to several heating compartments. (5) The chamber could be provided with baffles forming any desired number of sub-chambers having communication with each other; the baffles, however, preventing the formation of a definite upward current. This latter arrangement they at present consider preferable, and have illustrated.

Figs. 1 to 5 illustrate, by way of example, the application of the invention to a bed of ten retorts; fig. 6 relates to a bed of six retorts; and fig. 7 to a bed of two retorts. Fig. 1 is a half front elevation. Figs. 2, 3, and 4 are vertical sections on the lines A—A, B—B, and C—C, fig. 5. Fig. 5 is a sectional plan; the left side being taken on the line D—D, and the right side on the line E—E, fig. 4.

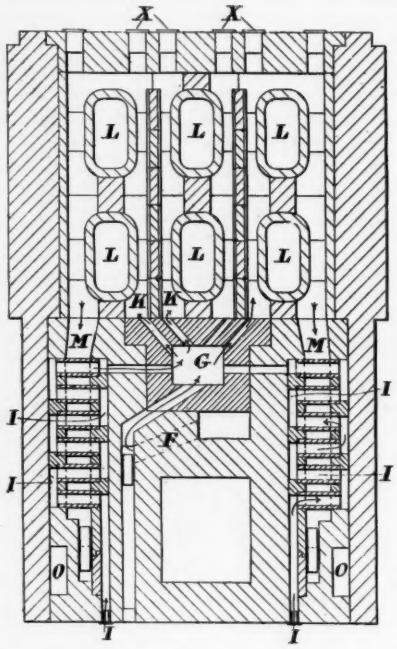


Fig. 6.

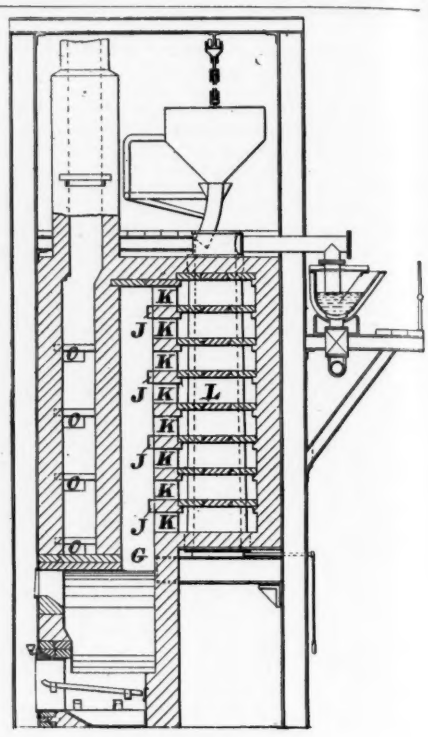


Fig. 7.

Referring first to figs. 1 to 5, it will be seen that the setting is divided vertically into two portions by a wall R, into which the two central retorts are built. Each portion has a separate vertical combustion chamber G; so that, if desired, only four or six retorts might be worked while the rest were not in use. This arrangement applies to settings of eight or more retorts, except that in the case of eight or twelve retorts, for example, none of the retorts need be common to both halves of the setting. Settings of fewer than eight retorts would not be thus divided; and a single combustion chamber—centrally situated and common to all the compartments—would, therefore, suffice, as in fig. 6.

The secondary air may be admitted at each side of the furnace; the amount required for various parts of the combustion chamber being separately controlled by adjustable slides or in other suitable manner. The air enters the regenerator passages I and passes through the openings J into the combustion chamber, which is provided with baffles S as already mentioned. The ports are so arranged that the gases are ignited at Y (fig. 5) in the back part of the combustion chamber; the object being that each port K shall better receive its share of the products of combustion.

The hot gases from the combustion chambers pass through the openings K into the setting, travelling horizontally between the retorts L in single streams. Then the combined streams, having given up part of their heat, pass between the outer retorts and the pier walls to the waste-gas passages M of the regenerators; and thence through openings controlled by dampers to the vertical flues O. In the lower portion of these flues are dampers, to regulate the flow of waste gases from each portion of the setting to the main flue Q.

The setting is shown as being divided by horizontal partitions T into four compartments at each side—each compartment having a separate regenerator. And each compartment may be further subdivided by any number of partitions V, which act as supports to the retort, but do not extend to the regenerator. The number of such compartments and subdivisions, however, is immaterial to the invention, and will in practice be adapted to the requirements of each particular case.

Referring to fig. 5, it will be observed that each compartment is heated by four streams of hot gases direct from the combustion chamber through ports K. Each stream is kept separate until it has passed over an equal amount of the exposed surface of the retorts—that is, each stream is at first confined to heating the exposed surface portions of two retorts; so that each side of each retort, except the outer ones in that division of the compartment, has a separate supply of heat. The streams then, having each given up an approximately equal portion of its heat, unite; and the combined stream, in consequence of its increased volume, suffices to heat to the required temperature the remainder of the exposed portions of the retorts on its way to the outlet M. Consequently, the greatest uniformity of heating is said to be obtained in each compartment; and this uniformity of heating, combined with the short travel of the heating gases in practice, "assists greatly in economizing fuel and in increasing the efficiency of the setting."

It is well known (the patentees here point out) that, in the practice of heating retorts, the heating gases must leave the setting at a temperature somewhat above the required heat for carbonizing (some of the heat being regained from the gases in the regenerator beyond the setting). Therefore, it follows that the shorter the paths of the streams of heating gases, the lower the temperature of the combustion chamber needs to be in order to maintain the carbonizing heat at the outlet; and thus less coke will be consumed in keeping the combustion chamber up to the relatively lower temperature.

Owing to the slight difference in length of travel of the streams of gas to the outlet M from each of the inlet ports K of any one compartment, it is desirable that the port which is furthest away from M should be slightly larger than the next, and so on; the one nearest to the outlet M being the smallest. However, the inventors find this difference to be so small that they prefer, in the first instance, to make all the ports of the same size; and then, after the bench is heated, to apply some fire-clay or other material to the ports so as to adjust their areas. For this purpose, the sight-boxes X are arranged exactly opposite the ports K, and the divisions T and V are made on the same level, so that the fire-clay may be easily placed into position by a rod introduced through the box at any time during working. If desired, fire-resisting blocks may be placed opposite the port, to prevent the gases entering the setting impinging directly upon the retorts.

Referring to fig. 7, the furnace is charged with coke from the ground level, instead of from the top of the bench. The separate producer-gas chamber may be dispensed with; the producer gas going directly to the combustion chamber G, and the waste gases from all the regenerators are collected in one flue immediately over the furnace—passing upwards to the chimney. The heat-regulating arrangements, enabling even or uneven heating to be obtained at will, are, however, the same in principle in this as in the benches previously described.

Concluding their specification, the patentees remark: "In the process of gas manufacture in vertical retorts having our improvements applied thereto, the heat applied to each part of the retort can be regulated as desired, so that the carbonization may proceed simultaneously throughout the length of the retort; and, owing to the short travel of the streams of heated gases coming from the combustion chamber into the setting, such streams need only have an ordinary carbonizing heat—that is, a lower initial temperature than in the present known forms of settings for vertical retorts. In the case of combustion chambers built at the top or bottom of the setting only, with consequent long travel of heating gases, when a retort is newly charged with a large volume of cold coal, the initial temperature of the streams of heating gases must of neccssity be exceedingly high, in order to be able to impart carbonizing heats to retorts throughout their length of travel, and then leave the setting at the required carbonizing heat. Moreover, in practice with long travels of heating gases, the temperature of such a stream of gases, when first coming in contact with a newly-charged retort, would probably drop below the carbonizing heat; and, in consequence, the carbonization of the coal, instead of proceeding simultaneously throughout the length of the retort, would begin at one end and gradually extend over the length of the retort, with consequent waste of time and inefficient results. Our retorts, not being exposed to such excessive ranges of temperature, will also be found more durable than in the latter case, or in the case of the compartments of the setting being converted into combustion chambers, as has previously been proposed in relation to vertical retorts."

The two claims for the invention are: (1) For heating vertical retorts in a setting divided into compartments by horizontal

partitions, the combination of a combustion chamber communicating with several compartments, means for delivering and separately controlling supplies of secondary air and producer gas to the various parts of the combustion chamber in proximity to the passages leading from the combustion chamber to the compartments, separate regenerators for the exit of the waste gases from each of the compartments, and means for separately controlling the draught through such regenerators from each compartment. (2) For heating vertical retorts in a setting divided into compartments by horizontal partitions, the combination with each of such compartments of a separate combustion chamber, means for delivering and separately controlling supplies of secondary air and producer gas to such combustion chamber, separate regenerators for the exit of the waste gases from such compartments, and means for controlling the outlets of such regenerators.

A HANDBOOK FOR GERMAN GAS-FITTERS.*

About four-and-a-half years have passed since we had the pleasure of reviewing† the first edition of Herr Kuckuk's handy little manual on gas-fitting, of which a copy of the second, and considerably enlarged, edition is now before us. We then expressed regret that the work would not be generally of service to English gas-fitters, owing to its being written in a foreign tongue, and to the dimensions and weights being given almost throughout solely on the metric system. The same expression of regret must be extended to the present volume, which should, however, prove a very useful, handy book of reference for the distributing and fitting staffs of gas undertakings in German-speaking countries.

Since 1904, there have been many advances, especially in the direction of the better utilization of gas for lighting purposes. For instance, inverted gas-burners were practically unknown in that year, whereas now Herr Kuckuk devotes several pages to them. Similarly, the immense development of high-pressure gas lighting has called for much fuller treatment of this branch of the gas-fitters' work. Flat-flame and argand burners are mentioned only as having historical interest, and no space is wasted on detailed description of them in what is essentially a practical manual.

We regret to see that the author, however, has not deemed the English types of gas-fires worthy of extended notice, and has practically confined his treatment of gas fires and stoves to the luminous-flame type with or without the regenerative passages introduced by Frederick Siemens. Speaking from careful and extended use of several gas-fires of this type of German manufacture, the writer of these lines has no hesitation in saying that they are far behind the better patterns of English gas-fires in respect of economy, efficiency, appearance, and durability. He believes that in some parts of Germany there have been restrictions imposed by local authorities, acting on academical advice, on the employment of gas-fires in which bunsen flames are used; but even so it is difficult to understand why such restrictions have been tolerated, and why consumers have been content to forego the manifold advantages of the English type of gas-fire.

In regard to apparatus in general, Herr Kuckuk has, we think, kept himself all too exclusively to the purely German types and designs, even bearing in mind that his book will circulate mainly within the confines of the German Empire. This is the hardest criticism we feel called upon to pass on it; for within that limitation it should prove a good and practical aid to the foreman and fitter. The new edition comprises about 320 pages, and has 388 illustrations. Since writing the first edition, Herr Kuckuk has advanced from the position of Manager of the Gas and Water Undertaking of the relatively unimportant town of Stolp to the same position at Heidelberg, where, moreover, the electricity works are also under his charge.

* "Der Gasrohrleger und Gaseinrichter." Ein Handbuch für Rohrleger, Gaseinrichter, Monteure, Gas-und Installationsmeister sowie Gastechniker, von Friedrich Kuckuk, Direktor der Städtischen Gas- Wasser- und Elektrizitätswerke Heidelberg, Zweite, vermehrte und verbesserte Auflage. Munich and Berlin, R. Oldenbourg, 1909.

† See "Journal," Vol. LXXXVIII., p. 168.

Air-Lift Pumping Plant.—Air-lift pumping plant operating two 8-inch wells forms part of the water supply of Palmerton (Ont.). The wells are 300 feet deep, drawing from a limestone stratum; and when the air-lifts are not working, the water rises to within 16 feet of the surface. A 5-inch discharge-pipe is placed inside the casing, and within this pipe is a 1¼-inch air-pipe. The air discharge outlets are placed 100 feet below the ground. It has been found, according to an article in the "Canadian Engineer," that a 60 per cent. submergence figured for a water level 38 feet below the surface gives satisfactory results. The compressor is a duplex machine with 12 in. by 16 in. steam and 12-inch square air ends, running condensing. In a ten-hour test, each pump delivered 250 gallons per minute, lowering the water from 16 to 40 feet, at which depth the level remained constant. When separately operated, the level in the spare well, 200 feet distant, was 10 feet above the level of the one being pumped. When discharging 450 gallons per minute, with an average lift of 39 feet, 0·38 cubic foot of free air is required per gallon.

ASSOCIATION OF GAS AND WATER ENGINEERS OF AUSTRIA-HUNGARY.

Annual Meeting at Graetz.

The Twenty-Eighth Annual General Meeting of the Association took place on the 20th to the 23rd ult., at Graetz, which, for the third time in the history of the Association, had been chosen as the *venue* of the annual meeting. About 125 persons attended. The following particulars of the meeting are taken from the official report in the "Zeitschrift des Vereines der Gas und Wasserfachmänner in Oesterreich-Ungarn."

The visitors were welcomed to the town at a reception given by the Polytechnic Club of Graetz, on the evening of May 20. Addresses of welcome were delivered by various members of the Municipality; and an appropriate reply was made by the President of the Association, Herr Anzböck, the Chief Inspector at Vienna of the Imperial Continental Gas Association. The technical proceedings opened on the following day in the theatre on the Frazensplatz. An annexe was devoted to an exhibition of apparatus. After an opening address by the President, the annual report of the Association was presented, and the following papers were read: By Dr. Strache, of Vienna, on "Modern Photometry;" by Herr Franz Bössner, of Vienna, on the "Inclined Carbonizing Chambers at the Municipal Gas-Works of Vienna;" and by Herr Peischer, of Innsbruck, on the "Rental System of the Innsbruck Gas-Works."

Herr Anzböck, in his opening speech, thanked the various representatives of the Municipality for their reception of the Association, and congratulated the members of the latter on the fact that so pleasant and instructive a town as Graetz had been chosen for the meeting place. Herr Lauda then welcomed the Association on behalf of the Minister of Public Works, who, he said, took a lively interest in the progress of gas and water supply. He was followed by the Burgomaster of Graetz, Dr. Graf, who said that he hoped the members of the Association would find the gas and electricity works, as well as the water-works of the town, well worth inspection. In presenting the annual report of the Association, the President remarked on the satisfactory progress which had been made in the past year. The Minister of Public Works had asked their co-operation in regard to the establishment of a Central Bureau of Water Supply and Purification. The Association had been represented at the Salzburg Water Congress. Reference was made also in the report to the question of the establishment of an official experimental works for gas and fuel apparatus. The progress of the Official Journal of the Association (formerly known as "Der Gas Techniker") had been most satisfactory. Herr Exner deserved thanks for establishing a technical museum for Technology and Industry at Vienna. The raising of the annual membership subscription from 15 to 20 kronen (1 krone = 10d.) had greatly benefited the finances of the Association. The publication of the statistics of water supply compiled by the Association had been delayed, owing to some questions not yet having been answered. There were 4 honorary and 253 ordinary members of the Association. Four members had died during the past year.

A visit was paid on the afternoon of the 21st ult. to the local gas and electricity works, which belong to the Vienna Gas Industry Company. The visitors were received by the Vice-President of the Company, Major a. D. Grünebaum, and were afterwards taken over the works by Herr Böhm, the Manager, and two of his assistants. In the evening, the Vienna Gas Industry Company entertained the members of the Association at a banquet. The proceedings next day opened with the private business of the Association, including the presentation of the accounts, the choice of officers for the ensuing year, and the selection of the place of the next annual meeting. Through the retirement of Herr Anzböck from the presidency, it became necessary to elect a successor; and Professor Adolf Friedrich, of the Agricultural College at Vienna, who is an authority on water supply, was chosen for the ensuing two years. After considerable discussion, owing to invitations having been also received from other towns, Innsbruck was selected for the place of the next year's meeting. The following papers were then presented: By Herr J. Häusler, of Vienna, on the "Use of Gas for Cooking, Heating, and Industrial Purposes;" by Herr Friedrich Lux, of Ludwigshafen, on a "New Electric Distance Lighter for Gas-Lamps;" by Herr H. Adolf, of Vienna, on "Preliminary Studies on the Quality of Underground Water;" by Herr Scholz, of Berlin, on "Advances in Inverted Lighting, with Special Reference to High-Pressure Gas and High-Pressure Air Intensifying Lamps;" and by Herr A. Achterberg," of Vienna, on "A Fast-Running Type of Gas-Engine, known as the 'Fafnir.'" These, as also two of the papers presented the preceding day, were read in an abbreviated form only, and will later be published in full in the official organ of the Association.

A visit was paid on the afternoon of May 22 to the new water-works at Andritz for the supply of the town of Graetz. A bacteriologically sound water is being obtained from a number of deep borings, which will be ready in July or August next to furnish the supply to the town. The new works are being carried out under the supervision of Herr Schnittler, the Manager of the works, and Herr Philipp, the Engineer of the Water Company. In the evening, the members of the Association were entertained at a banquet;

and on the following day they participated in an excursion to Peggau, where the electrical works of the firm of A. Buss and Co. were inspected. The party then visited the Lur grotto, which was illuminated for the occasion by means of acetylene and bengal lights; and after dining together at Semriach, the members returned to Graetz greatly pleased with the success of the meeting, which had been favoured with fine weather throughout.

Abstract-translations of the more important of the papers presented at the meeting will be given in the pages of the "JOURNAL" at an early date.

EFFECTS OF COMPRESSION AND TRANSMISSION ON COAL AND WATER GAS.

In the "JOURNAL" for the 25th ult. (p. 526), we published some extracts from the first portion of a paper on "The Effects of Compression and Transmission on the Candle Power and Heat Units of Manufactured Gas," submitted by Messrs. Bates and Rafferty at the annual meeting of the Illinois Gas Association. We now give the second part of the communication, which contains the results of investigations carried out by Messrs. V. A. Houghton and S. L. Cole.

The first series of tests were conducted on coal gas; tests being made on the gas immediately before and after compression, and also at a point 22 miles distant, *vid* the pipe-line. The size of the high-pressure main between these two points is almost entirely 4 inches; and its volume is approximately 11,900 cubic feet at atmospheric pressure. Great care was exercised in purging the line and in timing the rate of flow to make sure that the same gas was tested at both points of observation. The compressors draw their supply from the town holder, thereby assuring a more uniform quality of gas. The results obtained are shown in Table I. A record was kept of the high-pressure drippage for three days, which is shown in Table II.

TABLE I.—*Coal Gas.*

Works.								Testing-Station 22 Miles Distant.		
Holder Gas.			High-Pressure Gas.					C.P.	B.Th.U.	Aver. Diff. in Pressure.
Date 1908.	C.P.	B.Th.U.	C.P.	B.Th.U.	Pressure.	Temp. Ground. Deg. F.	Temp. Air. Deg. F.			
July 27	17·8	686	17·8	705	34	59	85	16·1	635	4·0
,, 28	17·9	673	17·9	683	28	59	85	16·2	656	4·5
,, 29	17·4	669	17·8	677	25	59	83	16·6	660	6·2
,, 30	17·7	669	17·4	663	30	60	80	16·3	653	4·0
,, 31	17·3	663	17·7	665	26	59	78	16·4	643	5 9
Aug. 3	17·8	665	17·4	675	32	59	84	16·2	634	3·8
,, 4	16·6	660	17·4	679	23	60	87	16·1	641	9·5
,, 5	15·5	648	16·7	665	28	59	85	15·8	637	8·0
,, 6	15·1	639	14·5	639	30	60	82	14·2	631	6·1
,, 7	15·9	647	15·1	648	29	60	79	15·2	633	6·3
Aver.	16·9	661	16·9	669	28·5	59	82	15·9	642	5·8

TABLE II.—*High-Pressure Drippage from Coal Gas.*

Works.					Line.			
Date, 1908.	Comp. Hours.	Gals. Drip.	Gals. per Comp. Hours.	Gals. per 1000 Ft. Pumped.	1467 Ft. from Works.	3604 Ft. from Works.	4190 Ft. from Works.	5200 Ft. from Works.
Aug. 6	23·00	32·25	1·40	0·116	6 gals.	1 qt.	1½ qts.	6 gals.
,, 7	20·00	30·75	1·53	0·127	3 qts.	1 pt.	1 qt.	3 ,,
,, 8	20·75	30·25	1·45	0·120	3 gals.	½ pt.	½ pt.	1 pint.

From the data obtained, it was evident that there was a difference in the quality of the gas before and after compression and transmission; but the proportions of each deteriorating factor were not satisfactorily apparent. The reason for the contradictory results obtained at the works testing-station—viz., the compressed gas having an equal or higher illuminating and calorific value than before compression in some cases and not in others—may be accounted for in the following manner: Since the outside temperature was about 80° to 85° Fahr. when these tests were conducted, it is possible that the compressed gas may, upon subsequent expansion in the photometer-room, have at times picked up hydrocarbon vapours from the condensate in the photometer and calorimeter leads. On the other hand, the compressed gas may not have lost its vapours on the high-pressure side of the regulator, due to the comparatively high temperatures. The compressed gas at some point not far distant from the works was reduced to the ground temperature, with a consequent loss; but the testing leads came from a point close to the compressor. Hence the compression loss was not obtained in some cases, but quite the reverse.

A second series of tests was conducted on straight water gas; three testing-stations being established at 3, 8, and 18 miles from the works. These stations may be designated as A, B, and C respectively. The line connecting them consists of 3-inch, 4-inch, and 6-inch pipe. The first part of this series of tests was conducted between the works and station B, the second part between the works and station C, the third part between the works and station A. Between the second and third parts several weeks had elapsed, and the weather had changed from moderately warm to cold. Circumstances had also compelled a change in the position of the apparatus at the works; the leads to the testing-room being made longer in consequence. However, the usual care was taken to thoroughly purge them before testing. The results are shown in Tables III., IV., and V.

TABLE III.—*Water Gas, between Works and Station B.*
[Transmission 8 Miles.]

Date, 1908.	Candle Power.			B.Th.U.			Pressures.		
	Works.		Station B.	Works.		Station B.	Works.	Station B.	Drop.
	Holder.	Line.		Holder.	Line.				
Sept. 16	18·3	19·2	17·2	628·3	599·5	588·9	30	20	10
,, 17	21·0	21·0	17·4	617 4	603 3	586·7	30	21	9
,, 17	23·3	19·8	18·4	..	..	598·1	35	22	13
,, 17	19 8	19·3	17·7	640·6	626·5	583·0	30	22	8
,, 18	20·9	20·3	18 5	626·8	624·1	583·9	35	21	14
,, 18	19·9	21·3	19·0	624·5	612·4	584·0	30	22	8
,, 19	21·9	21·2	18·1	645 4	628·6	588·2	40	24	16
,, 21	18·4	19·8	17·7	638·3	628·9	598·8	35	22	13
,, 21	18·8	18·7	19·6	646·7	628·8	597·6	35	20	15
,, 21	18·9	18·7	19·8	639·0	641·0	602·6	30	24	6
,, 22	20·7	20·5	19·0	644·7	633·7	589·1	40	28	12
,, 22	20·1	19·8	18·9	642 2	634·5	600·8	40	23	17
,, 22	21·3	21·0	19·4	643·6	640·3	610·0	30	22	8
,, 23	21·0	20·3	18·8	643·3	631·3	589·0	30	20	10
,, 23	21·3	20·6	19·9	644·4	636·5	614·9	35	18	17
,, 24	20·6	20·3	19·4	644·5	640·1	605·9	30	20	10
,, 24	..	20·7	19·8	..	648·3	619·9	35	18	17
,, 24	20·5	20·2	19·8	654·3	654·0	610·3	30	21	9
,, 25	20·6	20·1	19·4	643·3	648·9	610·3	30	21	9
,, 25	20·8	20·2	19·7	652·0	651·7	616·7	35	19	16
,, 25	19·9	19·8	19·4	644·8	650·8	604·5	30	22	8
,, 26	19·8	19·7	17·1	636·1	628·3	600 1	40	28	12
,, 26	20·1	19·7	17·9	636·6	632·4	602·7	40	25	15
Aver.	20·4	20·1	18·8	639·8	632·9	599·4	34	22	12

TABLE IV.—*Water Gas, between Works and Station C.*
[Transmission 18 Miles.]

Date, 1908.	Candle Power.			B.Th.U.			Pressures.		
	Works.		Station C.	Works.		Station C.	Works.	Station C.	Drop.
	Holder.	Line.		Holder.	Line.				
Sept. 30	20·2	19·3	17·5	612·4	609·2	613·5	30	16	14
,, 30	19·9	19 2	16·7	609·1	603·8	600 6	38	17	21
,, 30	19·9	19·7	16 0	609·4	615·9	597·0	30	19	11
Oct. 2	18·8	17·3	17 2	618·1	600·6	558·3	35	19	16
,, 2	18·4	17·4	17·3	614 4	603·0	551 5	35	17	18
,, 2	19·0	18·6	17 2	615·9	610·0	560·7	30	19	11
,, 3	18·9	18·1	16 8	609·3	608·1	595·7	39	25	14
,, 3	18·8	18·1	17·4	626·4	617·2	585 6	39	18	21
,, 5	..	19·5	17·9	615·9	626·1	612·3	30	20	10
,, 5	20·0	10·1	17·7	625 2	620·3	580·5	35	18	17
,, 5	19·8	20·1	18·2	624·8	626·3	581·7	30	23	7
,, 5	20·0	19·1	17·7	625·2	620·3	580·5	35	18	17
,, 6	20·8	20·3	18·3	625·4	629·6	594·1	40	21	19
,, 6	..	20·5	18·4	627·8	630·4	599·5	30	22	8
Aver.	19·6	19·1	17·5	618·9	616 0	587·1	34	20	14

TABLE V.—*Water Gas, between Works and Station A.*
[Transmission 3 miles.]

Date, 1908.	Candle Power.			B.Th.U.		
	Works.		Station A.	Works.		Station A.
	Holder.	Line.		Holder.	Line.	
Nov. 12	17·1	15·8	..	584 1	576·0	..
,, 12	17·0	15·9	15·4	571·3	569·5	549·9
,, 12	17·9	14·7	15·5	559·1	560·7	548·9
,, 13	16·7	14·8	14·4	568·7	568·0	549·7
,, 13	17·6	15·6	15·0	574·3	580·1	563·7
,, 13	17·6	15·9	14·9	573·0	592·0	561·7
,, 14	17·2	15·1	13·9	581·7	569·1	554·1
,, 14	17·2	15·3	14·1	585·3	580·3	556·0
,, 14	17·7	16·5	..	593·8	589·4	564·5
,, 16	18·1	15·3	14·7	597·8	585·8	551·9
,, 16	18·8	16·4	14·9	602·2	584·8	566·9
,, 16	19·3	16·0	15·3	617·4	588·6	572·3
Aver.	17·7	15·6	14·8	584·1	578·7	558·1

It had been observed that there was little difference in the drop of candle power between the 8 and 18 mile transmission; and it was determined to ascertain if the gas had dropped the greater part of its illuminants at a point nearer the works. This was the purpose of the third part of the series of experiments. At this

stage of the investigation, it was felt, as will be more fully explained later, that the data as obtained were not fully comparable, due to lack of knowledge as to the degree of saturation with vapours of the low-pressure gas being examined; and a final series of tests was therefore undertaken, in which an endeavour was made to obtain conditions as nearly as possible comparable throughout.

In these final tests, after operating the compressor for a sufficient length of time to make sure that a uniform sample of gas was present at both intake and outlet sides, a candle-power determination was made of the low-pressure gas, and at the same time a dew-point determination was also made of the same gas, using the hygrometer described in the paper read by Mr. W. H. Gartley before the American Gas Institute in 1906,* to ascertain at what minimum temperature the gas was saturated with vapours. It is understood that if gas is saturated at a certain temperature, subsequent heating will not increase the amount of vapour present, if the heating is conducted without the presence of any condensed vapours.

The compressed gas was then cooled to this so-called dew-point temperature in a cooling coil, and its candle power ascertained. In this manner it was possible to determine the compression effect alone. The data obtained, which are the averages of two to four tests each day, are shown in Table VI.

TABLE VI.—*Coal Gas.*

Date, 1908.	Low Pressure C.P.	Combined Dew-Point Temperature.	High-Pressure C.P.	Pressure in Pounds.	Temp. Photometer Room.	Temp. Outside Air.
Dec. 12	16·3	41°	15·3	20	66°	36°
,, 14	16·8	44°	15·1	27	67°	40°
,, 15	16·4	50°	14·7	30	66°	44°

The question arose as to whether the gas should be cooled in the coil under pressure or expanded and then cooled. It was found that when the reducing regulator was placed immediately at the outlet of the compressor and before the coil (thus receiving the gas at the high temperature at which it left the compressor), there was no loss in candle power, even though the gas was subsequently cooled to the dew-point temperature of the uncompressed gas. This seems logical, because this treatment practically amounts to compression and immediate expansion; restoring the gas to its original condition as to volume and temperature. In view of this fact, the gas was cooled under pressure and then expanded before being led to the photometer. Table VII. shows the results (the figures being the averages of two to four tests) corroborating these statements.

TABLE VII.—*Coal Gas.*

Date, 1908.	Low Pressure. C. P.	High Pressure. C. P.	Pressure in Pounds.
Dec. 10	16·9	16·9	30
,, 11	14·9	14·9	26
,, 11	15·0	15·2	26

Another question also arose as to the effect of the low-pressure gas being cooled to this dew-point temperature. It was found, as expected, that cooling produced no effect, as shown in Table VIII.

TABLE VIII.—*Coal Gas.*

Date, 1908.	Candle Power. Without Coil.	Candle Power. With Coil.	Combined Dew-Point Temperature.	Outside Temperature.	Photometer. Room Temperature.
Dec. 12	16·3	16·0	41	36	66
,, 14	16·8	16·9	44	40	67
,, 15	16·4	16·4	50	44	67

It was ascertained, in connection with this work, that the dew-point temperature, as indicated by the hygrometer, was much lower for the high-pressure gas cooled in the coil than for the low-pressure gas. This fact agrees with the loss in candle power.

A testing-station equipped with photometer, calorimeter, hygrometer, and cooling-coil was now established three miles distant from the works; and all possible precautions were taken to make sure that the same gas was tested at both points. Severe weather conditions had now set in; and it was found that the dew-point temperatures at the testing-station were always lower than those of the compressed and cooled gas at the works—indicating that the pipe-line was subjecting the compressed gas to a lower temperature in transmission than the comparable temperature which the cooling-coils were designed to effect. In other words, the compressed gas arrived at the pipe-line testing-station having been subjected to a lower temperature than that to which it was being cooled for comparative purposes by the coil at the works. Had the dew-point temperature at the pipe-line station been higher than that of the compressed gas issuing from the coil at the works, it would have been necessary to cool to the comparable temperature at the pipe-line station in order to determine the transmission effect, if any.

As a matter of useful information, the hydrocarbon dew-point was determined in most of these later tests in addition to the combined dew-point—that is to say, the gas was passed through calcium chloride, thereby extracting water vapour, before being passed to the hygrometer. As will be shown subsequently, the hydrocarbon dew-point was found to be lower than the combined dew-point in all cases, whether the gas examined was compressed or uncompressed. Table IX. shows the compression loss alone and the loss due to further cooling in the pipe-line for varying conditions. Different dew-point temperatures are also recorded.

* See "JOURNAL," Vol. XCVI., p. 449.

TABLE IX.—*Coal Gas.*

[Col. A.—Combined dew-point temperature. Col. B.—Hydrocarbon dew-point temperature.]

Date, 1908.	Works. Low Pressure. C.P.	A.	B.	High Pressure. C.P.	A	B.	Pres	Testing-Station Three Miles Distant. C.P.	A.	B.
Jan. 18.	17·1	35	..	13·7	22	..	42	12·7	*	..
,,	17·4	35	..	14·1	22	..	35	12·1	..	..
,,	17·3	35	..	13·7	22	..	36	12·1	..	..
,,	16·5	37	..	13·8	22	..	36	..	..	..
,,	16·5	37	..	13·9	23	..	37	..	..	..
,,				13·9	23	..	38	..	..	..
Aver.	16·9	36−	..	13·9	22+	..	37·3	12·3	..	..
Jan. 20.	15·0	37	24	10·9	24	18	41	10·0	9	..
,,	14·9	37	24	10·9	24	18	40	9·9	9†	..
,,	15·0	32	25	10·8	24	18	40	10 0	9	..
,,	15·1	32	25	10·9	24	18	41	9·1	9	..
,,								9·1	9	..
,,								9·2	9	..
Aver.	15·0	34+	24+	10·9	24	18	40·5	9·6	9	..
One test	B.Th.U. 607·0	32	25	B.Th.U. 597·3				B.Th.U. 591·3		
Jan. 21.	15·3	42	32	11·4	31	25	45	10·1	8‡	..
,,	15·3	42	32	11·4	31	25	45	9·9	8	..
,,	15·8	48	36	11·6	35	27	27	10·2	8	..
,,	15·9	48	36	11·6	35	27	36	10·2	8	..
,,				11·7	35	27	35	11·1	11	..
,,				11·7	35	27	35	11·4	11	..
Aver.	15·6	45	34	11·6	34−	27−	39	10·5	9	..
One test	B.Th.U. 623·9			B.Th.U. 614·0				B.Th.U. 600·4		
Jan. 22.	16·4	50	35	15·5	40	33	21	14·8	17·0	6
,,	16·4	50	35	15·6	40	33	21	14·8	17·0	6
,,	15·9	47	37	15·3	40	33	23	14·1	17·5	8
,,	16·0	47	37	15 4	40	33	23	14·1	17·5	8
,,				15·4	40	33	24	14·1	17·5	8
Aver.	16·2	48	36	15·4	40	33	22·4	14·4	17·3	7
One test	B.Th.U. 619·2							B.Th.U. 581·6		

* 15° obtainable, and no dew-points observable. † 3° obtained, and no hydrocarbon dew-points reached. ‡ No hydrocarbon dew-point obtainable.

Lastly, a set of tests was made for candle power and dew-point on (1) uncompressed gas, (2) compressed gas cooled to the dew-point temperature of the uncompressed gas, and (3) compressed gas cooled as much as possible with salt and ice, thereby duplicating severe pipe-line conditions. The results obtained are given in Table X.

TABLE X.—*Showing Effect of Compression and Cooling on Coal Gas.*

[Col. A.—Combined dew-point temperature. Col. B.—Hydrocarbon dew-point temperature.]

Date, 1909.	(1) Low Pressure. C.P.	A.	B.	(2) High Pressure. C.P.	A.	B.	Pres.	(3) High Pressure. C.P.	A.	B.	Pres.
Jan. 26.	14·6	47	32	12·7	26	17	31	9·6	19	11	32
,, ,,	14 6	47	32	12·7	26	17	31	9·6	19	11	32
Aver.	14·6	47	32	12·7	26	17	31	9·6	19	11	32
Jan. 28.	17·2	47	34	14·9	31	25	35	12·3	28	23	30
,, ,,	17·4	47	34	15·0	31	25	35	12·3	28	23	30
,, ,,	17·7	46	37	15·3	34	28	31	12·5	29	24	30
,, ,,	17·7	46	37	15·2	34	28	31	12·5	29	24	29
Aver.	17·5	46+	35+	15·1	32+	26+	33	12·4	28+	23+	30−
Jan. 29.	15·3	42	30	12·4	31	26	39	11·7	29	25	35
,, ,,	15·4	42	30	12·5	31	26	39	11·7	29	25	35
,, ,,	15·8	43	31	12·6	31	26	39	11·8	29	25	35
Aver.	15·5	42+	30+	12·5	31	26	39	11·7	29	25	35

Analyses of some of the condensate collected during the last series of tests are appended, showing the conditions under which it was collected and various boiling-points. The condensate was obtained from 1000 cubic feet of high-pressure gas passed through the cooling coil; the temperature of the coil being maintained at the combined dew-point temperature of the uncompressed gas.

Samples of High-Pressure Condensate.

Sample No. 1.

106 c.c. water, or 0·028 gal.
159 c.c. oil, or 0·042 gal.

265 c.c. total, or 0·070 gal.

Pressure limits, 30 to 35 lbs.
Dew-point temperature of low-pressure gas, 43° to 49°.

Sample No. 2.

141 c.c. water, or 0·0373 gal.
124 c.c. water, or 0·0327 gal.

265 c.c. total, or 0·0700 gal.

Pressure limits, 26·5 to 32 lbs.
Dew-point temperature of low-pressure gas, 39° to 52·5°.

Fractional Distillation.

Sample No. 1. Per Cent.			Temperatures. Deg. C.	Sample No. 2. Per Cent.		
21	..	10·5 c.c.	28 to 80	4 c.c.	8	No. 1
			80 ,, 90	11 ,,	22	,, 2
			90 ,, 110	16 ,,	32	,, 3
76	..	38·0 ,,	110 ,, 116	7 ,,	14	,, 4
			116 ,, 150	10 ,,	20	,, 5
3	..	1·5 ,,	Residue above 150°	2 ,,	4	,, 6
100	..	50·0 c.c.		50 c.c.	100	

The specific gravity of fraction No. 3 was found to be 0·874, and that of the total, without the residue fraction No. 6, 0·879.

The preceding experiments have been recorded in their order as made, without much attempt to draw conclusions or afford explanations, which it should now be advantageous to summarize as well as possible. As the work proceeded, the difficulty of obtaining exactly comparable data became more evident, with the constant necessity of changing the method of testing and introducing more apparatus. Errors in this, or the necessity for some greater refinement of practice developed by its use, partially invalidated some of the work, causing much necessary duplication of tests and many delays. In this connection, it may be stated that too much stress should not be laid on the results of the heat unit determinations, especially the first series, which were undertaken before the report of the Committee of the American Gas Institute had laid down necessary rules of practice to avoid certain errors. The calorimetric work of the later tests, however, is deemed to be fairly trustworthy.

For the photometric work, both stationary and portable bar photometers were used; the portable instrument being established in the later tests close to the compressor. Great care was taken to avoid the errors ordinarily accompanying the use of portable photometers. In the early tests, both pentane and the Elliott kerosene standards were used; the latter being checked with sufficient frequency against the pentane. In the later tests, only pentane standards were employed; and they were carefully checked against each other.

Turning to the tests themselves, it is clear that in the early ones there was no exact knowledge of the condition of the low-pressure gas as to degree of saturation with vapours; and the comparison between the low-pressure and the high-pressure gas at the works is of no particular value. The comparison between the low-pressure and the high-pressure gas at distant points on the pipe-line gives the total loss resulting from compression and subsequent cooling to the ground temperature, but is deficient in that the relation of this temperature to that to which the low-pressure gas had been previously exposed, is lacking. For such of these tests, however, as were made in the summer months, there was probably no great difference between the low-pressure saturation temperature and the ground temperature to which the high-pressure gas was cooled in the pipe-line; and, therefore, the results of the tests are not without value.

In the later tests, the extent to which the hygrometric determination of the combined dew-point may be accepted as reliable in respect of the temperature the low-pressure gas had been exposed to—that is, its temperature of saturation—was first established; and this hygrometric determination was checked by cooling the low-pressure gas to this temperature, and determining that by such cooling it suffered no loss in illuminating power. The gas was then compressed and cooled under pressure to this same temperature; and the loss shown is that due to compression alone. When a gas exactly saturated with a vapour is compressed from zero to 15-lb. gauge pressure, its volume is cut in two, and it will necessarily drop one-half of the vapour, provided there be no change in temperature. This condition of no change in temperature is the one which it was endeavoured to set up in the later series of tests.

When it came to making pipe-line determinations, it was found that the ground temperature was so low (due to the weather conditions then existing) that additional cooling of compressed gas took place, with a consequent further drop in illuminating power; and this could be doubled by duplicating the temperature conditions in the cooling-coil at the works. It is evident that there is no so-called transmission loss, but that there is a loss resulting from compression and subsequent cooling, which is dependent upon the pressure to which the gas is compressed and the temperature to which it is afterwards cooled. There are further conditions, the effect of which is still indefinite, as shown by the peculiar variations in the results—viz., previous treatment of the gas and rate of loss due to varying combinations of hydrocarbon vapours present, and the effect of these vapours and of the water vapour on one another in the total process of condensation.

With regard to the last, the question has arisen as to whether the water vapour present has any precipitating effect on the hydrocarbon vapour. It would seem that if, for example, we have a gas saturated with both hydrocarbon and water vapours (say, at 60° Fahr.) and this gas is cooled to 40° Fahr., if either water or hydrocarbon vapour be artificially removed, the one remaining should precipitate at 40° Fahr. But it was found that at all temperatures the hydrocarbon vapours precipitated at a lower temperature than the combined vapours; and also that the water vapour dew-point (the hydrocarbons being extracted by finely divided rubber) was much lower than either the combined or the hydrocarbon dew-point (see Table X.). This indicates the need and possible value of careful study into the condensation of compressed gas, with the view of conserving as far as possible the hydrocarbon vapours.

PRODUCING NITRATES FROM THE ATMOSPHERE.

The subject of the production of nitrates from the atmosphere has been in rather unusual prominence in the course of the past fortnight. Attention was first called to it by a paper read at the meeting of the Royal Society of Arts, on the 26th ult., by Herr Sam Eyde, of Christiania, who described the Birkeland-Eyde process, which he is working at the Notodden factory in Norway; and a few days later it was brought under the notice of the delegates at the International Congress of Applied Chemistry.

Taking the earlier paper first, Herr Eyde began by pointing out that more than a hundred years ago Priestley and Cavendish observed that the oxidation of atmospheric nitrogen took place on heating in an electric flame; and that men like Sir William Crookes and Lord Rayleigh had, with others in recent years, made some valuable contributions to the subject. Shortly describing the difference between previous methods and that in which he was specially interested, it was sufficient to say that he and his colleague had applied large quantities of energy in the electric arc, and had found out the best method of doing this; while it was previously believed that it was small quantities of energy that gave relatively the best results. It was on this assumption that the apparatus employed by them was constructed; and, consequently, their invention completely revolutionized the theory of the process of atmospheric combustion. By bringing quantities of energy into the electric arc, and finding the most suitable electric conditions and most serviceable types of furnace, the author claimed that they had created the synthetical nitrate industry.

After this introduction, Herr Eyde gave a description (illustrated by lantern slides) of the Notodden works, and explained the process carried on there, of which the following is an outline. The flame chamber of the furnace is formed of fire-clay brick, through the walls of which the air is conveyed to the flame. The nitrous gases formed escape through a channel made along the casing of the furnace, which, like the flame chamber, is furnished with fireproof lining. The temperature in the flames exceeds 3000° C. or perhaps 3500° C. The temperature of the escaping gases may vary between 800° C. and 1000° C. during ordinary working. The furnaces are made of cast steel and iron; the middle of the furnace being built out to a circular flame chamber, into which the electrodes are led radially. By the aid of centrifugal fans, the air is brought into each furnace through tubes from the basement. When the air in the flame chamber has been treated by the electric flames, the nitrous gases formed pass out through a channel built along the casing of the furnace, and thence through the lower part of the furnace to two fireproof-lined gas-collecting pipes, about 6 ft. 6 in. diameter, which convey them through the basement to the boiler-house, where they pass through four steam-boilers, in which their temperature is lowered. From the boilers the gases pass on through an iron pipe into the cooling-house, where the temperature is further considerably reduced. From the cooling chambers they go on to the oxidation-tanks, whence they are led into the absorption-towers, filled with broken quartz, which is not affected either by nitrous gases or by nitric acid. Of the entire quantity of nitrous gases passed through the absorption system, about 97 per cent. is absorbed. The finished nitric acid coming from the towers, which has a strength of about 30 per cent. by volume, is collected in granite cisterns, from which it is drawn to what are called the "dissolution works." These consist of granite vats filled with limestone, over which the acid is poured. This drives off, with violent effervescence, the carbonic acid contained in the limestone, while the nitric acid takes its place and forms a watery solution of nitrate of lime, or calcium nitrate. This is pumped into vacuum evaporating apparatus, and its concentration continued until the specific weight of the liquid at a given temperature shows a content of 13 per cent. of nitrogen. The solution is then sufficiently evaporated, and can be pumped up into the solidification chambers, fitted with shallow iron pans, under which cold air is pumped to accelerate cooling. After some time, the nitrate stiffens into a brittle crystalline mass, hard as stone. This is broken up into lumps, and is taken into the crushing-machines, which reduce the mass to a granular state. The resulting coarse powder is raised by an elevator to a vat, from the bottom of which it is tapped into casks holding 100 kilos. net.

Nitrate of lime, produced in the way described, is used in various chemical works as well as for manure. It is its value for the latter purpose, in competition with nitrate of soda and sulphate of ammonia, that concerns our readers. In recent years, a number of well-known men and institutes connected with agriculture have undertaken experiments for the purpose of testing its effect under various climatic and other conditions and on different kinds of soil; and according to Herr Eyde, all the experiments have fully confirmed the expectation of men of science when the new manure first appeared—viz., "that 1 lb. of nitrogen in the form of nitrate of lime has the same effect, both in quality and quantity, as a similar amount of nitrogen in the shape of nitrate of soda; in other words, that nitrate of lime is equal to nitrate of soda as a manure." Three trials with oats were made

by Mr. James Hendrick, the Chemist to the Highland and Agricultural Society of Scotland, with the following average results:—

	Yield per Acre. Grain. Pounds.	Straw. Cwt. Qrs. Lbs.
1.—No manure	2348	33 0 21
2.—Phosphate and potash only	2532	37 1 6
3.—Same as No. 2 with nitrate of soda	2774	41 3 1
4.—Same as No. 2 with sulphate of ammonia	2774	41 3 24
5.—Same as No. 2 with nitrate of lime	3121	43 1 13

The following are the results of experiments made on roots at University College, Reading, by Professor John Percival:—

	Yield.
1.—Nitrate of lime, 1½ cwt. per acre	37·00 tons.
2.—Nitrate of soda ,, ,,	36·00 ,,
3.—Sulphate of ammonia, 1½ cwt. per acre	32·50 ,,
4.—No manure	27·75 ,,

Herr Eyde pointed out that the largest crops had been obtained with the use of nitrate of lime, even when the same gross quantities had been employed, notwithstanding that the nitrate only contained 13 per cent. of nitrogen, against 15 per cent. in nitrate of soda and 20 per cent. in sulphate of ammonia.

At the International Congress of Applied Chemistry, the subject was introduced by Professor Bernthsen, who referred to the process described by Herr Eyde, and said that the chief difference between it and its predecessors was that it utilized a large quantity of energy in a single discharge. He remarked that the great importance attaching to the possibility of the fixation of atmospheric nitrogen had several years ago been recognized in the Badische Anilin-und Soda-Fabrik; and after the task of manufacturing indigo on a commercial scale had been brought to a successful conclusion in 1897, special attention was paid to this new problem at the instigation of the Managing-Director, Heinrich von Brunck. As the result of these labours, Otto Schonherr succeeded in 1905, after eight years' work, in discovering and, with the assistance of the engineer Hessberger, in working out a process for producing an electric arc flame of a new form; and he was thus enabled to solve the problem in a surprisingly simple manner presenting considerable advantages over the method of Birkeland and Eyde. The new method was not a mere modification of their process, but differed fundamentally from it. Whereas Birkeland and Eyde caused the electric discharge to burn in a strong magnetic field, and thus spread it out in the shape of a flat (more or less circular) disc, Schonherr dispensed entirely with magnets and magnetic fields, and produced his arc inside an iron tube of comparatively small diameter, at the same time passing the air through the tube, and thus bringing it into contact with the arc. The methods in use for oxidizing and absorbing the nitrous gases and for converting the aqueous solution of nitric acid into nitrate of soda or lime were then dealt with by Professor Bernthsen, who pointed out that the greater concentration obtained by the new process he had described constituted an important advantage over that of Birkeland and Eyde. He concluded by giving some interesting details relating to the commercial and industrial development of his process. An agreement had, he said, recently been entered into with the Company exploiting the Birkeland and Eyde patents in Norway; and two new Companies had been formed, with capitals of 16,000,000 and 18,000,000 kronen repectively, to develop water power and erect works for the manufacture of nitrates.

The Gas Institution Benevolent Fund.

The Committee of Management of the above-named fund report that during the year ended Dec. 31, 1908, the amount of £337 11s. 1d. was received; subscriptions produced £144 1s. 6d.; donations, £97 7s. 5d.; interest on investments, £94 11s. 8d.; and interest on bank deposit account, £1 10s. 6d. The sum of £239 15s. 9d. was expended—viz., £212 10s. in the assistance of ten necessitous cases, and £27 5s. 9d. for printing, postages, bank charges, and incidental expenses. Leaving out of account the amount received from donations (an uncertain source of income), the receipts practically only just met the expenditure. The Committee feel that with the means at present at their disposal they are in many cases unable to afford as much relief as is deserved. As they would like to deal adequately with all the applications that are brought under their notice, they hope all those members who have not yet done so will become annual subscribers. They express much regret that during the period under review the fund suffered the loss by death of Sir George Livesey, who was one of the Trustees and a constant supporter for many years. At a special meeting of the contributors held for the purpose of filling the vacancy thus caused, Mr. Charles Hunt was unanimously elected. The suggestion made at the last annual meeting of the contributors, that steps should be taken to arrange for the representation of the District Associations on the Committee of Management, has been fully considered by the Committee, and unanimously adopted. With the object of giving effect to it, an alteration to Rule 12 will be proposed at the forthcoming meeting, whereby the District Members of Council may be added to the Committee. The desirability of arranging for contributors to have the power of nominating candidates for service on the Committee of Management has also been considered. Believing that such a provision would tend to increase interest in the fund, the Committee recommend the necessary alteration to Rule 13, which will be submitted for approval at the meeting.

SEVENTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

The proceedings connected with the Seventh International Congress of Applied Chemistry, which was opened in London on the 27th ult. (*ante*, p. 583), were formally brought to a close last Wednesday, when the President (Sir William Ramsay) announced that the congress had been attended by 3000 members and 650 ladies. The reports presented by the Presidents of the different Sections showed that, out of 105 papers presented to the Section of Analytical Chemistry, 60 were read and discussed; the Section of Inorganic Chemistry and Allied Industries heard and discussed 47 papers; and of 111 in the Section of Organic Chemistry and Allied Industries, 60 were read. It was resolved that all the communications should be submitted to an English Publication Committee, on the understanding "that they be judged with perfect fairness and impartiality." The Committtee will consist of experts in all branches of science—members of the Chemical Society, of the Society of Chemical Industry, of the Iron and Steel Institute, and similar bodies. The American Ambassador (Mr. Whitelaw Reid) read a letter from the Secretary of State of the United States, intimating that the President had approved a joint resolution of the Senate and the House of Representatives inviting the members to hold the Eighth International Congress in the United States in 1912. He said that if the delegates accepted the invitation, they would go next to a country which looked especially on the work of science as, above all, tending to promote happiness and diffuse peace among the nations of the earth. Dr. Wiley, of the Department of Agriculture, Washington, and Professor Meldola, representing the Society of Chemical Industry, supported the invitation; and it was accepted with acclamation. It was then resolved that Professor E. W. Morley should be the Honorary President and Dr. W. H. Nichols the Acting-President of the Eighth Congress; and with expressions of thanks by the delegates for the entertainment extended to the members, and by the President to the University of London and the Imperial College of Science and Technology for the use of their buildings, the proceedings closed.

In addition to the papers noticed last week, others were submitted on the following subjects in which our readers are more or less closely interested.

Power Gas from Low-Grade Fuels.

Mr. B. G. M'Lellan, in the course of an interesting paper on the above subject, said that in the early days of gas-producer practice it was customary for the users of these plants to be somewhat restricted in their choice of suitable fuel. The purchaser of a gas-producer of almost any one of the usual types found that while the maker of the plant gave a very generous statement that any coal was admirably suitable for use in it, he was obliged as a matter of fact, after trials with the cheaper coals, to limit himself to one or two classes of fuel. Thus, one might find that a gas-producer user at Sheffield, in the heart of the South Yorkshire coalfields, was obtaining his coal from some entirely different source. The colliery owners consequently, as soon as they found that they possessed a supply of coal which was in demand for a special purpose, raised the price; and this particular fuel left the class of what, from a money point of view, might be called low-grade fuels. The natural course of development for gas-producer practice lay in the conquering of these difficulties, and in giving to the power-gas maker the ability to use the particular class of coal which could be obtained cheaply in his locality. The author dealt *seriatim* with the difficulties attending the use for producers of bituminous or coking coals, and of fuels high in ash content or producing a fusible ash. On the latter point, he stated that for producers doing high duty the proportion of ash in the fuel is of great importance; while if this ash is of a fusible nature, further difficulties, due to clinker formation, will occur. Briefly stated, the conditions which go to the formation of fused hard clinker were a fusible coal ash, a large percentage of ash, a thick fuel bed, and a low steam and air-blast temperature. M. Marconnet, of Paris, had invented a producer which aimed at the removal of these troubles. In this apparatus coal dust was employed—the dust and air being blown into the producer in the proper proportion. The heat generated was so intense that the ash was melted and might be tapped off at the bottom. The gas generated from gas-producers using bituminous coal was charged with soot or tar, which had usually to be settled or scrubbed out. The aim of those working on the subject, therefore, should be to design and construct a producer which would turn out a gas requiring less purification. This was a problem which had been much neglected by chemical technologists in this country, and had been left almost entirely to engineers; whereas it demanded most careful study by a chemically-trained mind.

M. Sepulchre, of Paris, and Mr. A. B. Searle, of London, contributed two papers describing gas-producers for dealing with low-grade fuels; and following these, three papers were submitted on bye-product coke-ovens by representatives of the types now in general use.

Liquid Fuel.

A lecture on this subject was delivered by Sir Boverton Redwood. He pointed out that our principal fuels, in addition to wood, are coal and petroleum, including the natural gas yielded by some petroliferous territory and the products obtained by the

destructive distillation of bituminous shale. To these might be added, as of secondary importance, lignite, peat, and alcohol. In February last, President Roosevelt announced the calling of an international conference on the conservation of natural resources, and stated that the first immediate result of the conference was expected to be a general inventory of the natural resources of the world; an effort being made to ascertain just where the world stands regarding such resources, what has been done by different nations towards their conservation, what is best to be done, and what may be reasonably expected. As an illustration of the importance of such action, attention might, said the lecturer, be drawn to a recent report in which Dr. David T. Day, the petroleum statistician of the United States Geological Survey, gave the data upon which he arrived at the somewhat startling conclusion that, at the present rate of increase of the output of petroleum, the known oilfields of that country would, on the basis of the estimated minimum quantity of oil obtainable, be exhausted by the year 1935; while if the present output were maintained, the supply would, on the same basis, only last for about 90 years. Within recent years there had been a rapidly growing appreciation of the value of petroleum as liquid fuel, and the holding of this congress furnished an appropriate and timely opportunity for a general international review of the subject. Having described the sources of petroleum, Sir Boverton passed on to deal with the question of its uses. In this connection, he said that it seemed almost certain that for most purposes on land the internal combustion engine would before long replace the steam-engine, at any rate for moderate powers; for whereas the best types of the latter furnish only about 12 per cent. of the energy of the fuel in the form of work, the former can ordinarily be made to yield 25 per cent., and in the case of the Diesel engine the return is as much as 37 per cent. At the same time, he wished to utter a few words of warning against any indulgence in extravagant anticipations in regard to the extent to which liquid fuel might replace coal. A comparison of the output of coal and petroleum showed at once that even if the whole of the petroleum now being obtained were employed as fuel, it would displace but a small percentage of the coal; and it must be borne in mind that the present output of petroleum had been the outcome of very large expenditure extending over half-a-century. Nobody knew what additional stores of oil lay concealed in the earth; but it was in the highest degree unlikely that the quantity available was such as to revolutionize the fuel industry.

Air and Coal Dust.

Professor P. Bedson, of Newcastle, read a paper on the "Inflammability of Mixtures of Air and Coal Dust." The author described a method and apparatus for the experimental study of this question founded on that suggested by Professors Holtzwart and Von Meyer, and modified by Mr. Widdas and himself. One gramme of the air-dried sample of coal dust, ground so as to pass through a No. 100 sieve, is projected by compressed air into a cubical tin box provided with mica windows, the mixture of air and dust being ignited by a coil of platinum wire. The temperature attained by the coil can be altered at will by varying the current passing through it; and in this way a record can be obtained of the temperature necessary to ignite samples of coal dust of different origin and composition. It has been found by direct experiments with this apparatus that coal dusts differ very materially in their inflammability; the current required for heating the wire ranging from 10·8 up to 17 amperes, and representing a range of temperatures from 800° C. up to 1400° C. The dust from brown coal was found to be the most readily inflamed; while bituminous coal dust containing a high percentage of volatile matter came next in order of inflammability. Mineral charcoal and finely divided wood charcoal do not inflame under the conditions of the test. Damping the dust was found to raise the ignition or inflammability point considerably; an increased current of between 0·7 and 2 amperes being required in these cases. An admixture of silica with the coal dust had a similar effect.

Decomposition of Cements.

M. Le Chatelier read a paper on the above subject. He stated that all hydraulic cements decompose more or less rapidly on contact with water saturated with sulphate of lime, or on contact with sea water. The object of his investigations had been to study these reactions in the laboratory by submitting different products of this type to the prolonged action of certain salt solutions. The cements used in the experiments were mixed with the largest possible amount of water in order to obtain porous briquettes, and then were moulded in the form of cylinders 0·8 inch in diameter and 0·8 inch in height. After a setting and hardening period of one month's duration, the cylinders were divided longitudinally into four pieces; and the small briquettes thus obtained were immersed in the salt solutions. The conclusions drawn by the author from his investigations were that there is at present no hydraulic cement which can be guaranteed to stand prolonged immersion in sea water. The least destructive results are obtained with cements that contain an addition of puzzuolana, and by employing the least possible quantity of water for mixing.

Road Making and Repairing.

Two papers dealing with these subjects were submitted by delegates from America. Mr. Allerton S. Cushman, Assistant-Director of Public Roads in the United States Department of Agriculture, in a paper entitled "The Contribution of Chemistry to the Art of Road Building," remarked that the growing use of the automobile had made it apparent that even the best form of ordinary macadam construction is unfitted to stand the disruptive action of rapidly moving rubber tyres. It was from this point onwards that the engineer was absolutely obliged to turn to the chemist for information in regard to new forms of road-building and road-treating materials. Those which had been principally used to overcome this difficulty consisted of the natural oils or their residues and the various forms of tar products resulting from the destructive distillation of coal. Neither oils nor tars were in any sense standard substances; they varied widely in their physical characteristics. The engineer was quite helpless to cope with the subject without the aid of the chemist; and therefore the author emphasized the necessity for young civil engineers who are training themselves in road construction to take up a thorough course in the chemical laboratory, in order that they may not only be well posted in regard to the nature of binding materials, but may act in the capacity of analysts and investigators as occasion arises.

The author of the other paper was Mr. Prevost Hubbard, also of the Roads Office of the United States Department of Agriculture; his subject being "The Examination of Bituminous Road Binders." The author dealt with the necessity of establishing systematic methods of examining various bituminous materials employed as road binders. The methods employed by the United States Office of Public Roads were described in some detail; and their applicability to the different bitumens, as well as their practical value, was discussed. Considered broadly, bituminous road binders may be divided into two main classes: (1) Oils and oil products, including asphalts; (2) tar and tar products. An outline of what the author believes to be the most important determinations relative to each class is as follows: (1) The examination of oils and oil products for colour, odour, specific gravity, flash and burning points, flow or melting point, consistency, volatilization (character and consistency of residue), total bitumen and insoluble organic and inorganic matter, naphtha, insoluble bitumen. (2) The examination of tar and tar products for colour, odour, specific gravity, flow or melting point, consistency, results of distillation, free carbon or soot (material insoluble in carbon bisulphide). Where a mixture of the two classes is suspected, a combination of the methods will often be required to determine the character of the mixture.

The Smoke Problem.

A paper on "The Legal Status of Industries Giving Rise to Noxious Gases" was read by Dr. Baskerville. Though it was based on the author's operations in America, his criticisms were applicable to this country, where only one law is enforceable, though local requirements are widely different. He argued that decisions should not rest with lawyers, but with a Board composed of persons possessed of knowledge of what was possible and reasonable. Dr. Elliott, of New York, threw all the blame for smoke on the engineer who persists in using fuel direct, where its previous conversion into gas would result not only in greater cleanliness but in economy; while Mr. Chamberlain thought the problem might be left to take care of itself, as manufacturers were fast realizing that black smoke meant loss to them. Ultimately the following resolution was passed: "That an International Commission be appointed to establish uniformity in the control of the escape of noxious gases."

Patents Worked on Licence.

In the Section devoted to Law, Political Economy, and Legislation Affecting the Chemical Industry, the Lord Chief Justice, as President, discussed, in his Inaugural Address, the right method of legislating respecting scientific knowledge. He said he did not believe there should be different rules in different countries; but as far as possible they ought to see whether in the British Empire, France, Germany, the United States, and other great countries, they could not approximate to an international code in connection with the proper protection of inventions. Recent legislation in Great Britain made it a condition that there should be working in the country in which the patent had been taken out. In his opinion, this was a step in the wrong direction, as it would discourage inventors, and would make many people revert to secret processes—one of the worst forms by which inventions could be developed. Further, it was hard upon the genuine inventor, who was often a very bad man of business. It was not too late, he hoped, to suggest, from an international point of view, that patents should be worked by those desirous to work them on fair royalties paid to the patentee. There ought to be international recognition of invention and discovery. There was no class of invention to which the observations he had made applied more strongly than to the chemical industry. Knowledge was the birthright of no particular nation, and should be shared by the whole human race. There ought to be no temptation to bottle-up or keep secret the discoveries of scientific men or the results of their labours. The perfect system would be to give to every inventor a fair and full—might he say a generous?—reward for his invention, and relieve him in many cases of the anxiety of developing it, so that he would be free to pursue his studies for the benefit of mankind, and, further, to investigate the inexhaustible fields of knowledge yet unexplored. The following resolution was adopted: "That the Committees of the various countries party to the International Convention for the Protection of Industrial Property be requested to consider the advisability of

adopting the provision that the manufacture in one country of the union protects the patentee against revocation of his patent in all countries."

CARBONIZING COAL IN BYE-PRODUCTS COKE-OVENS.

In a paper by Mr. E. Lloyd, of Manchester, the author set forth the progressive changes which the coal undergoes in the modern bye-product coke-oven during the coking period, and the character of the carbonization products. When the coal is charged into the coke-oven, carbonization of the surface quickly results in a dense layer, about 1½ inches thick, composed of coal in the process of decomposition. The tar and water vapour resulting from this decomposition condense on the cool side of this layer farthest away from the wall, and are in turn re-distilled as the heating proceeds inwards, and again condensed on the cool adjacent coal; this process going on until the carbonization penetrates to the centre of the charge. Until the layer undergoing carbonization advances to the middle, the coal in the interior of the charge is unchanged. This condensation of the moisture and tarry matters on the inner layers of a charge plays an important part in the coking process; the latter acting as a binding material of the coal particles, particularly in the case of poorly coking coals.

With regard to the rate of penetration of the heat into the charge, according to Herr Hilgenstock the temperature at the centre rises to 100° C. towards the end of the first hour, remaining stationary at this temperature until the end of the eighteenth hour. The rise in temperature from 100° C. becomes gradually slower as the inner zones are reached; whereas the temperature immediately above the coal ranges between 800° and 900° C. Similar results have been obtained by other observers in this country; the time at which the temperature at the centre of the charge rises above 100° C. varying with the nature of the coal, the width of the oven, moisture, and the temperature of carbonization.

The constitution of the gases evolved in the coking process is essentially that of coal gas obtained in retorts in ordinary gas making; being, however, richer in hydrogen and nitrogen. At the beginning of carbonization, the gas is rich in illuminants and relatively poor in hydrogen. As the coking proceeds and the temperature increases, the illuminants and the methane steadily decrease, and the hydrogen steadily increases in proportion.

With respect to the passage of the gases, there appears to be a difference of opinion; it being maintained on the one hand that they pass to the centre and upwards through the charge, and, on the other, that they pass outwards and upwards between the outside of the charge and the walls of the oven. The difficulty which the gas would have in forcing its way through the finely-ground and closely-packed coal would alone appear sufficient to preclude the former view; while the formation of "scurf" on the walls through the breakdown of the hydrocarbons in the gas in contact with the highly-heated surface, the increased density of the outer coke, with, in many cases, the actual appearance of carbonaceous feathers of carbon deposition on it, give support to the latter view. It would be not unreasonable also to expect results, as regards the constitution of the tar and the yield of ammonia, analogous to those obtained in the vertical retorts for gas making, if the former view be correct. But this is not the case. It is probable, however, that when the coking of the charge has advanced to the inner core, the gases begin to pass upwards through the centre, through the clearage which forms in the centre of the charge.

The paper concluded with descriptions of the Simon-Carvès regenerative and non-regenerative vertical fluid coke-ovens.

Action of Coal Gas upon Asphalt.

In a recent number of "Het Gas," an account was given by Heer Terneden of a case of corrosion of an asphalt pavement in Amsterdam. A number of fissures were noticed in the asphalt, and leakage of gas was detected. The pavement was repaired, and an attempt was made to put the cost upon the gas undertaking. The author pointed out that asphalt is soluble in the presence of some of the constituents of coal gas—benzol, for example; but he thought the risk should not be exaggerated. In the first place, the bed of concrete under the asphalt should be impermeable to gas. If it is not, escaping gas will, of course, reach the asphalt. But this may crack of itself when worn by traffic; and in this case it suffers more than it does from the effects of gas. When attacked by the latter, it becomes soft underneath, and the cracks are not very deep and their edges are soft. When 41 grammes of asphalt are placed in 1 cubic metre (35·3 cubic feet) of gas, the weight increases by 75 grammes, and the asphalt softens; but it returns to its original condition in two or three days. Compressed asphalt is more resisting than that which is merely melted and spread. When cracks are found in asphalt, the adjacent gas-pipes should be carefully examined; but it must not be concluded that the fissures are necessarily due to an escape of gas. Even if there should be one, the thickness of the pavement must be taken into account, for it may have been too much worn to last.

The Manchester and District Junior Gas Association are arranging to visit the works of Messrs. W. J. Jenkins and Co., at Retford, next Saturday. Subsequently, the members will have the choice of joining in a drive through the "Dukeries" or of being shown round the Retford Gas and Water Works by the Engineer and Manager, Mr. T. B. Fenwick.

THE USE OF TAR FOR ROADS.

Some Hints from America.

At the last Annual Meeting of the New England Association of Gas Engineers, Mr. C. P. Price, of Malden (Mass.), read a paper, illustrated by lantern slides, on the subject of the use of tar for roads. In the course of it he gave the following as the latest and best methods of using tar as a surface preservative and for the construction of new roads.

The road surface is swept clean of all loose material and the tar is applied hot by means of a spreading-machine, or it is delivered on the road surface by means of a hose attached to the tar-waggon. Whichever method is used, it is necessary to provide several men with "squeegees" for removing surplus tar from the depressions in the road, and to prevent the liquid material from running into the gutters. As soon as the tar has been spread, and while it is still hot, a quantity of clean pea-stone should be applied, as evenly as possible, and immediately afterwards rolled with the steam-roller. Upon the following detail depends the success of the work: The tar used should be refined to the proper consistency; crude tar containing water and ammoniacal liquor is unsuited for the purpose. The road should be free from dust, and bone dry. The pea-stone should be applied in every case while the tar is still hot.

In constructing tar macadam roads by the penetration or grouting method, the following specifications were offered as being the latest development of this class of work: Broken local stone shall be spread, bound and rolled on the roadbed, prepared as before described. The width of the broken stone shall be 15 feet. The stone shall be laid in two courses, the lower of which shall be 3 inches thick at the centre and 2 inches deep at the sides; the upper course, 2 inches thick at the centre and 1½ inches deep at the sides. The depths of the courses shall in each case be as if measured after rolling. In both courses the stones shall vary from ½ inch to 2½ inches in their longest dimensions.

After the bottom course, above described, is thoroughly compacted, broken stone screenings shall be spread thereon, and rolled until the interstices between the stones are filled. The screenings so used may contain the dust, and they shall not be larger than will pass through a ½-inch mesh. After the bottom course has been rolled to the satisfaction of the engineer, and evened up to conform to the proposed cross section, the top course shall be spread and rolled until fairly compact and as the engineer shall direct. When the stones are absolutely dry, a refined tar, conforming in all particulars to the requirements hereinafter specified, heated to a temperature approximating 180° Fahr., shall be grouted into the voids between the stones of the upper course until all the interstices are filled with the tar, and a thin coating of tar covers the tops of the stones. The tar may be poured from hods or buckets, it may be distributed by a hose with a flattened nozzle, or it may be sprayed from any machine of which the engineer approves. If necessary to secure proper distribution of the tar and the surface film above required, the tar shall be broomed while hot.

The quantity of tar used shall be not less than 1¼ nor more than 1¾ gallons to the square yard of surface to which it is applied. As soon as possible, after the tar is applied to the satisfaction of the engineer, a thin, even layer of sand shall be spread thereon to such a depth that, after rolling, no surplus tar shall appear at the surface. The sand used shall be clean, sharp, and dry, free from loam, clay, and adventitious matter of all kinds. It shall contain no pebbles which will not pass through a ½-inch mesh, nor practically any grains or particles which will pass through a screen of 100 meshes to the linear inch.

If the contractor prefers, he may use stone screenings in place of the sand; but such screenings shall conform in all respects to the specifications for sand contained herein. When the sand or screenings have been applied, the road shall be rolled again to the satisfaction of the engineer. All rolling shall be done by a steam road-roller, of such weight and pattern as the engineer shall approve.

Each course shall be evened-up with material of the same sizes and quality as have been used therein, and to the satisfaction of the engineer; and deficiencies or inequalities in the surface of either course shall not be filled with sand or stone screenings. All broken stone shall be spread from the carts by hand, or from a dumping board or self-spreading carts. No soft or disintegrated stone shall be used.

If so ordered by the engineer, the thickness of the broken stone shall be increased or diminished at such points as he may direct. The grade of the finished surface of the road shall present a crown of half-an-inch to the foot.

The tar must be uniform in colour, character, appearance, and viscosity, and must have the following qualities: (*a*) It shall contain not more than 0·5 per cent. of mineral matter or dirt. (*b*) It shall have a specific gravity between 1·18 and 1·25. (*c*) It shall not contain more than 14 per cent. by weight of free carbon. (*d*) It shall contain no body that distils at a lower temperature than 225° C., nor more than 10 per cent. by weight shall distil below 270° C., and it shall contain at least 65 per cent. by weight of pitch or bituminous material remaining after all bodies up to 360° C. have been distilled. (*e*) When 20 grammes are heated in a flat-bottom dish, 3 inches in diameter, for 21 hours, in an oven kept at a temperature of 100° C., the loss shall be not more than

10 per cent. by weight. (*f*) It shall be of such viscosity that 60 c.c., measured at the room temperature (78° Fahr. or 26° C.), shall, when at 100° C., be not less than 85 seconds, and not more than 240 seconds, in passing through a viscosimeter orifice 5·64ths of an inch in diameter when acting under a head of 4¼ inches.

When 12½ per cent. by weight of the material is mixed with 87½ per cent. by weight of sand, of such a grade that all will pass through a sieve having 10 meshes, and practically none through a sieve with 190 meshes, to the linear inch, and briquettes are made 3 inches square and ½ inch thick, such briquettes will so harden in seven days at ordinary room temperature that, when laid flat and held by their edges by two parallel knife-edge bars, they shall not bend when a weight is suspended from a third knife-edge or parallel bar placed across their centre, until this weight reaches 200 grammes, and shall not break at less than 250 grammes, and the weight causing bending shall not be greater that 80 per cent. of the weight causing breaking.

This tar specification is considered the best so far issued. It provides very simple and effective tests, and while these are considered as well adapted for comparing various bituminous materials, there is some question as to whether the material that will meet this particular specification is of a quality best adapted for the purpose. It will be noted that the percentage of free carbon is 14. This would, in almost every case, exclude straight coal tar; and the admixture of a considerable quantity of refined water-gas tar is necessary to meet the test given.

In constructing bituminous macadam roads by the mixing method, the following description gives the details of construction employed by the Rhode Island Department of Public Roads: The first course of No. 1 stone is laid in place and shaped to the proper grade, and on this surface is laid a 3-inch course of tarred No. 2 stone. The stones are tarred on a mixing-board; the bituminous materials being heated in tar-kettles alongside the road. The 3-inch course of tarred stone is thoroughly rolled; and when this work is finished, a flush coat of bituminous material is applied on the surface and covered with a light coating of stone screenings free from flour. In the Rhode Island work, in a number of experiments, an asphalt residuum has been used with the tar, and has given excellent results. The Rhode Island bituminous macadam roads are without doubt the best examples in the United States; and the estimated cost above ordinary macadam is about 21 c. per square yard.

A Joint Conference of Commercial Sections.

It has been arranged to hold a joint conference of the Gas Association Commercial Sections next Tuesday afternoon (Institution week), at 4 o'clock, in the meeting hall of the Institution of Mechanical Engineers, at Storey's Gate, S.W. Mr. H. Kendrick, the Hon. Secretary, *pro tem.*, says it is earnestly trusted that every member of a Commercial Section will be present; and all gas engineers interested in the work will be heartily welcomed, as it is hoped that important developments affecting the movement will accrue from this meeting. It has been suggested, also, that every member should invite his chairman or a representative of his committee or board to attend the meeting. Among other matters to be considered at the conference, will be: The publication of reports of the Commercial Sections; tar quotations; and sulphate sales.

Gas-Engine Pumping-Station.—The city authorities of Philadelphia have contracted for a new high-pressure pumping-station driven by gas-engines for fire service. It is to be practically a duplicate of the city's existing station, which has proved such a success. According to some particulars in "The Times," it will contain ten 300 H.P. Westinghouse vertical single-acting engines supplied with gas from the city mains. A year's records from the old plant report 32 alarms and nine services ranging from a few minutes to 24 hours, during which 27 million gallons were pumped at an average cost of 12·5 c. per 1000 gallons. Any unit can be started to deliver water at 300 lbs. pressure in 45 to 60 seconds, and the whole put in commission in seven to ten minutes.

Treatment of Road Surfaces to Prevent Dust.—Reports received from various parts of the country show that local authorities are still favourably impressed with the value of coal tar as a preventive of dust on roads. At the same time, other materials are being tried with the same object. For instance, during the past two months Messrs. Brunner, Mond, and Co. have been supplying chloride of calcium in the form of a granulated powder for spreading on roads; and tests are now being carried out by the Roads Improvement Association, in conjunction with local authorities and the firm, on the behaviour of this material in comparison with the chloride of calcium solution. The use of a piece of virgin road between Ashford and Stanwell, half-a-mile in length, has been given by the Staines Rural District Council for the purpose of special tests; and the experiments will be watched during the next few weeks by a Committee appointed by the Association. It includes Mr. H. P. Maybury and Mr. A. Dryland, the County Surveyors of Kent and Surrey, Mr. George Manning, the Engineer and Surveyor to the Staines Rural District Council, and Mr. W. J. A. Butterfield, F.I.C., F.C.S. The work of dusting the road with the powder began on Monday last week. This system of dust prevention depends for its success on the property of chloride of calcium to absorb moisture from the atmosphere; the effect being, it is claimed, to keep the road sufficiently damp to prevent the formation of dust.

REGISTER OF PATENTS.

Lighting and Extinguishing Gas-Lamps.

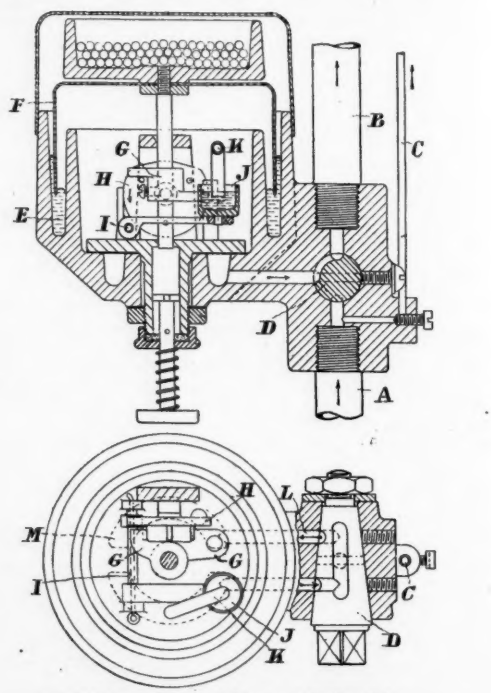
LEOPOLD, O., of Südende, near Berlin.

No. 3941; Feb. 17, 1909. Date claimed under International Convention, March 3, 1908.

This gas-igniter, working by increases of pressure and intended for use in street-lamps and the like, is of the type in which a cam disc provided with pins is turned by means of a rising and falling bell; the cam disc controlling a liquid closure for the gas supply. The chief feature is that a catch-block which engages with the pins of the cam disc has two projections, which engage successively on the rising and falling of the bell with successive pins on the disc and turn the disc always in the same direction.

From already known devices of this type, the present invention is distinguished, firstly, by the special method of controlling the gas-supply valve by means of the cam disc, and, secondly, especially by the arrangement named—that all catch plates or the like are dispensed with and the turning of the cam disc takes place always only in the same direction. A further advantage consists in that, in consequence of the considerable lift of the bell (which far exceeds the lift of previously known devices, and which can be increased according to need), slight variations of pressure in the gas-pipe never can become effective upon the control of the gas-supply valve.

These advantages are attained in the following manner: For the shutting off of the gas which flows to the burner, use is made of a movable quicksilver closure, raised or lowered by the depression or elevations formed on the periphery of the cam disc. By this means, on the one hand, the free end of the fixed gas-supply tube is opened or closed, and, on the other hand, in consequence of the quicksilver weight, a finger of suitable form sliding upon the periphery of the cam disc is firmly pressed thereon, so that a braking effect ensues between the two. By this effect, moreover, the cam disc is prevented from being accidentally turned by jerks or other outside effects. The cam disc, together with the driving pins, always moves in only one direction, in consequence of the special arrangement for the driving of the cam disc through a catch block with two projecting arms. These projections are so planned in their horizontal and vertical distance, that one comes into engagement with a pin of the cam disc on the rising of the bell, while the other pin can move past the edge of the other projection. Upon the sinking of the bell a second projection engages with the corresponding pin of the cam disc, while the first projection moves past its pin. Thus considerable free up and down motion is allowed to the bell "whereby it is further secured that small unavoidable changes of pressure in the gas-pipe will not affect the actuation of the gas-ignition apparatus."



Leopold's Gas-Lamp Lighter and Extinguisher.

A indicates the end of the pipe from the street connection; and B the pipe leading to the main burner. C is a pipe for the bye-pass burner; and D is an adjustable gas-cock (of any known construction). The casing is hollow inside, and has an annular cavity E containing quicksilver, into which there dips the bell F (open underneath), on which is placed a receptacle which can be weighted with shot. The bell bears in the middle a rod to which is attached a specially constructed catch-block G—secured by a set-screw. Beside the rod is placed a disc H, which has at a given point one or more curved depressions, and upon the cam disc are placed three pins. Against the periphery of the disc a finger rests, firmly keyed upon one end of the shaft I. At the other end of the shaft is firmly secured an arm, which is normally in the horizontal position and bears upon its outer end a vessel J, filled with quicksilver, into which a tube K dips.

The gas flowing from the main passes into the inner channels L M, and thence through apertures into the interior of the casing. The construction is shown at the moment at which a pressure wave has been passed through the pipes, and the bell is again falling—the right-hand projection leaving the right-hand pin. As the bell rises, the cam disc H, with its pins, is turned in a counter-clockwise direction so far that the pin at the left passes directly under the left arm of the catch-block G. If, then, the pressure which has been sent through the pipes is relaxed, the weighted bell sinks down and will turn the cam disc by means of the left pin. Hereupon the curved depression shown comes opposite the finger on the shaft I, and, consequently, the arm, together with the quicksilver vessel J, is allowed to fall as far as the curved depression allows. The pipe K then no longer dips into the quicksilver in the vessel, and the gas from it can then freely flow through the apparatus and finally through a corresponding bore of the cock D into the main burner. By the turning of the cam disc H, the lowermost pin is turned to the right, and is raised until it comes to rest above the right part of the catch-block G. As soon, therefore, as, for the purpose of putting out the lamp, a pressure wave is sent through the pipes, and the bell F is raised thereby, the disc H is simultaneously turned, the curved depression comes out of engagement with the finger, the vessel J is thereby again raised, and the pipe K closed, which cuts off the supply of gas to the main burner.

Gas-Compressing Apparatus.

TEE, H., and ADAMS, F. E., of Birkenhead.

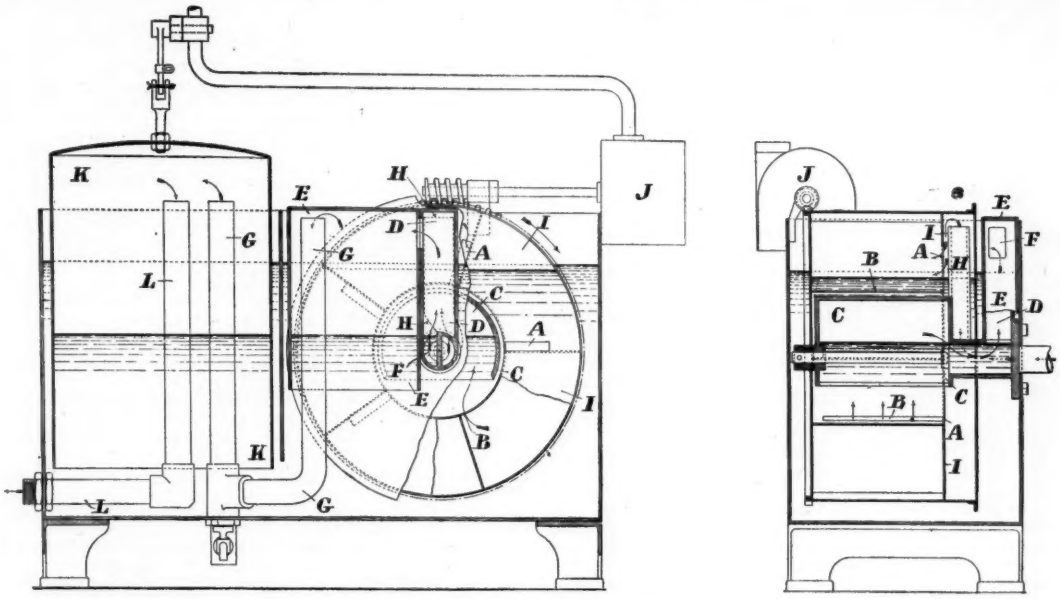
No. 9823; May 6, 1908.

This invention has reference more particularly to compressors in which the gas is compressed to a comparatively small pressure—such as is required in many cases for use in burners for lighting and heating. It has primarily for its objects to provide simple and inexpensive apparatus which is "efficient and will maintain a uniform pressure and supply or delivery in itself, and is without valves."

In the apparatus shown, the outer container is open at the top, and is fitted with a rotary drum having chambers in it. The openings in the chambers are at one end, and in the inner cylindrical wall; and they (A B) are respectively radial to, and parallel with, the drum axis. A central collecting vessel C fits inside the open central portion of the drum; and the gas collected in it passes, by way of a branch at the lower portion of the vessel C—concentric (say) with the axis of the drum—up an outlet conduit D, in connection with which there is used an inverted narrow vessel E dipping into the liquid in the container, to which the gas passes by an opening F, and from which it flows by a pipe G projecting up into it.

The gas enters the apparatus at the central conduit, and passes up, through a pipe H, into the upper part of one end of the revolving drum, which constitutes a species of similar chambers formed between the end plate of the drum, and an inner plate I forming the inner wall to the chambers, and extending between the outer and inner concentric cylinders of it.

The vessel and conduits are stationary, and carry the drum by a spindle fixed in the outer end plate and working in bearings in the stationary vessel C. The drum may be revolved by a water or other motor, or by other suitable means, such as a direct mechanical drive. When the apparatus is driven by direct mechanical drive, and economy of "power" is of little moment, the gas will be supplied in excess by the rotation of the drum, and the surplus simply escapes from the central collecting vessel C and passes up through the water into the upper part of the drum-chamber—that is, to the inlet openings A B, which it again enters, and is forced down and re-delivered. In cases where the drum is driven (say) by a water-motor or the like, as in the case shown, the motor J may be regulated by the pressure of the gas supplied through a bell K working in the containing vessel, and to the interior of which gas is delivered by the continuation of the pipe G, and



Tee and Adams' Gas-Compressing Apparatus.

from which it passes away by the pipe L, so that the pressure acts upon the bell and regulates its height in the liquid. By the movement of the bell through the levers to which it is connected, a valve for controlling the supply of working fluid to the motor is operated (closed or opened) as the pressure rises or falls. In this way, the rotation of the drum is governed by the pressure of the gas compressed or forced by it.

Exhausters.

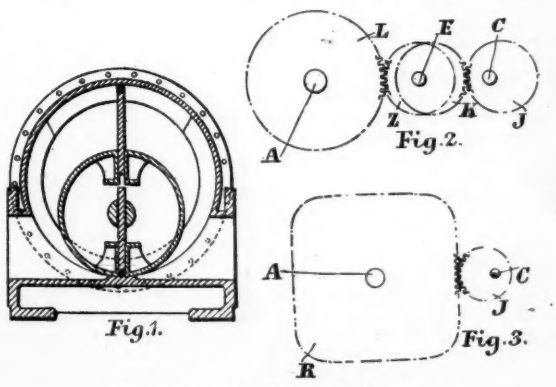
WALLER, E. B., of Stroud, Glos.

No. 10,324; May 12, 1908.

This invention relates to driving gear for exhausters, compressors, and the like, so as to overcome certain difficulties that have arisen from the fact that when the drum is driven at a substantially constant angular velocity the peripheral velocity of the blades varies at different points in the rotation of the drum—being less when passing the inlet and outlet port region than it is throughout the remaining portion of the revolution. The effect of this increased peripheral velocity at the point where the blades are most extended and are doing most work, is to cause fracture of the blades.

Fig. 1 represents a cross section of a well-known form of exhauster with two blades disposed along one diameter. Figs. 2 and 3 represent two forms of the improved driving gear.

On the shaft A of the exhauster is a gear-wheel L; and on the countershaft E is another gear-wheel Z, of such diameter in relation to the wheel L that the former shall rotate two, three, or four times the speed of the shaft, according to whether there are two, three, or four blades. On the countershaft E is also mounted an eccentrically set gear-wheel K, engaging with a similarly eccentrically set gear-wheel J on the driving shaft C. It will be seen that if a constant angular velocity is given to the driving shaft C, a varying angular velocity will be transmitted to the countershaft E. If the two gear-wheels K and J are of equal diameters, this varying velocity of the countershaft E will vary from a minimum to a maximum and back to the minimum during one complete revolution of the shaft C; and this cycle of variations can be transmitted to the blades of the exhauster any desired number of times during one complete revolution of the blade by adjusting the relative diameters of the gear-wheels Z and L. For instance, with a three-blade exhauster it is



Waller's Driving Gear for Exhausters.

necessary that the blades shall be travelling at a minimum circumferential velocity three times in one complete revolution of the shaft A; and therefore the gear-wheel L must rotate once every three revolutions of the gear-wheel Z.

For an exhauster having three or more blades, a convenient form of gearing for obtaining the desired variations for the blade speeds is an

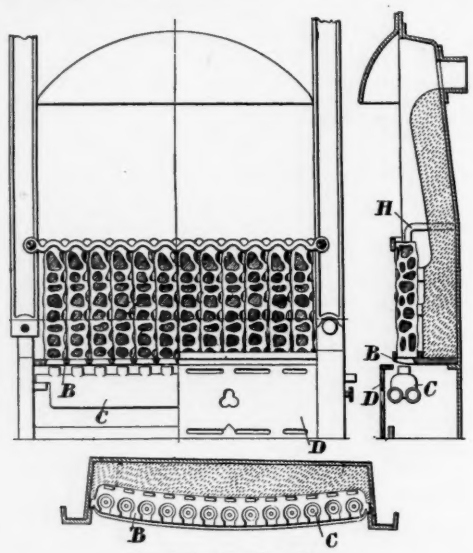
eccentric pinion measuring with a lop gear. Such a gear arranged for a four-blade exhauster is shown in fig. 3, in which the driving pinion J, set eccentrically on the driving shaft C, gears with a lop wheel R, carried on the shaft A, whereby four speed changes are effected in each revolution of the blower spindle.

Gas-Fires.

YATES, H. J., of Birmingham.

No. 15,782; July 24, 1908.

This invention relates to gas-fires heating to incandescence a mass of refractory material—the patentee claiming to obtain better combustion of the gas and more effective utilization of the heat generated than in apparatus of ordinary construction.



Yates' Gas-Heating Stove.

He employs any "suitable refractory material as the so-called fuel," and shapes the same into separate irregularly formed skeleton tubular columns with apertures in the sides and ends. The columns are supported vertically on a perforated tray B, which takes the weight of the fuel, and, in the event of breakage, prevents the falling of the pieces on to the burner, as is experienced when the fuel is suspended from the upper side of the grate. The tray is secured at a sufficient distance above the outlet orifices of the burner-tube C to admit the usual supply of air in addition to that previously mixed with the gas at the inlet to the burner. The detachable cover D, whereby the burner is enclosed, is also perforated with apertures or shaped to provide an opening along its upper edge, to ensure the requisite auxiliary supply of air to the underside of the tray or fuel support. Within the grate a fire-brick back, preferably of the cross section shown, is provided behind the fuel. In order to prevent possible displacement of the fuel, projections H are formed with, or embedded in, the fire-brick back to engage with the apertures in the fuel, or a single metal clip or binding strip may extend across the front of the fuel at its upper part and be secured at its ends to the frame as shown.

Vertical Retorts.

BROOKE, R. M., of West Vale, near Halifax, and ROBERT DEMPSTER AND SONS, LIMITED, of Elland.

No. 16,405; Aug. 4, 1908.

This invention consists essentially in the provision of separate combustion chambers and regenerator flues in connection with each of the compartments into which the setting is divided by the usual horizontal partitions, each of such combustion chambers having a separately regulated supply of secondary air and producer gas, and the amount of draught on each compartment being also separately regulated.

An illustrated abstract of the specification appears upon p. 643 of to-day's "JOURNAL."

Automatic Ignition of Gas-Lights.

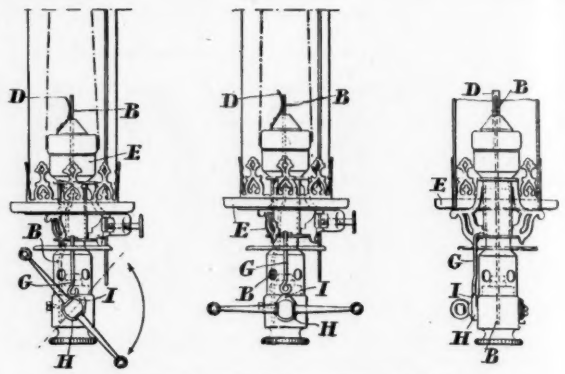
RUPPERT, H., of Zurich, Switzerland.

No. 19,315; Sept. 14, 1908. Date claimed under International Convention, Sept. 15, 1907.

This invention relates to automatic gas-lighters in which the gas is ignited by sparks caused by friction between two suitable materials on the turning on of the gas-tap. This action causes a part rigidly supporting the moving part of the igniter first to be displaced upwards in a vertical direction and then allowed to drop, under the action of its own weight, to its initial position.

The illustration gives views of a burner in the closed and half opened positions of the tap respectively; also a section of the latter at right angles.

In the burner, a wire B is fixed in the interior of the gas-supply pipe (instead of the usual pilot burner pipe), and projects above the top of the burner. The projecting (somewhat roughened) part of the wire is in contact with a sheet spring D, fixed on the burner-cone. The part E of the burner has fastened to it a depending piece G, of wire, the lower



Ruppert's Automatic Gas-Burner Igniter.

end of which rests on the plug of the tap H, which is provided with a cam-piece I.

To ignite the gas, the tap is turned from the closed to the open position. By turning the tap, the part G, and with it the liftable part of the burner, is raised somewhat by the cam-piece I until the tap attains the half open position. On the further rotation of the tap into the open position, the part G and the part E of the burner slide down into the former position. By this relatively quick up-and-down movement of the part E of the burner, friction is caused between the spring D (participating in the movement) and the end of the stationary wire B, which suffices for the production of sparks. As simultaneously with the production of the sparks gas begins to flow, the latter is ignited.

APPLICATIONS FOR LETTERS PATENT.

12,168.—GILL, A., "Inverted burners." May 24.
12,178.—DUNCAN, W., "Gas-deflector for mantles." May 24.
12,247.—SCHEIDIG, M., "Producing power gas from a bituminous fuel or combustibles." May 24.
12,268.—WILLS, C. E., "Gas stoves and cookers." May 25.
12,299.—NEWHOUSE, W. A., "Inverted globe holders." May 25.
12,314.—RENKEWITZ, E., "Controlling gas-burners from a distance." May 25.
12,315.—DUCKHAM, A. M'D., "Discharging and charging gas-retorts." May 25.
12,363.—KOPPERS, H., "Coking and gas-generating ovens." May 25.
12,384.—THOMSON, J. M., and BRODIE, R. B., "Conveyors for coal." May 26.
12,397.—DARWIN, H., "Gas-lamps." May 26.
12,398.—DARWIN, H., "Atmospheric burners." May 26.
12,400.—DUCKHAM, F. E. & A. M'D., "Discharging and charging gas-retorts." May 26.
12,429.—POTTER, W. G., "Regulating gas." May 26.
12,466-7.—HADDAN, H. J., "Incandescent bodies for gas-burners." A communication from Bruno-Patente-Verwertungs G. m. b. H. May 26.
12,470.—GIORGI, A., "Controlling the supply of gas to burners, and igniting same." May 26.
12,508.—THORP, T., "Combined anti-pulsator and pressure regulator for gas-mains." May 27.
12,527.—FITZPATRICK, H. D., "Incandescent burner." A communication from Société Anonyme "Alumina." May 27.
12,534.—HEINEN, L., "Gas-generators." May 27.
12,546.—DARWIN, H., "Inverted burners." May 27.
12,579.—NEUE KRAMERLICHT G. M. B. H., "Forming and hardening inverted mantles." May 27.
12,606.—SOLON, M. F., "Regenerative gas-burners and stoves." May 28.
12,650.—ROBIN, J. I., "Bunsen burners." May 28.
12,652.—MEHLER, M., and LOHMANN, G., "Measuring the calorific value of solid fuel." May 28.
12,678.—FALK, S., "Inverted burners." May 28.
12,683.—SCHIMMING, G., "Gas-engines." May 28.
12,713.—HAWLEY, W., "Grids for gas-purifiers." May 29.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read a second time and committed: Pontypool Gas and Water Bill, Wakefield Corporation Bill.

Bill read the third time and passed: Musselburgh Gas Order Confirmation Bill.

As may be remembered the Gaslight and Coke Company Bill was put down for the third reading stage last Thursday night; but as the House adjourned early it did not come up for discussion on Mr. W. Thorne's motion for its rejection. It was therefore fixed for the following day, during the time devoted to private business; but it was "passed over," and was once more set down for to-night—Mr. Thorne's motion still remaining on the paper.

Petitions have been presented against the Alliance and Dublin Consumers' Gas Bill by the Dublin Corporation, the Dublin and Wicklow County Councils, the Killiney, Ballybrack, Dalkey, and Pembroke Urban District Councils, and the North and South Dublin, Rathdrum, and Rathdown Rural District Councils; and against the South Staffordshire Water Bill, by the Earl of Dudley.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Livesey Memorial Fund.

SIR,—Will you allow me to thank you for the interest you have taken in the Endowment Fund for the Livesey Memorial Professorship, and particularly for the appeal made in the editorial columns of last week's issue of the "JOURNAL."

The object of the fund has received the approval and support of a large number of individuals, companies, and a number of corporation gas committees. It only requires for those members of the Institution who have hitherto stood aloof to now take a part in this grand movement, and make it truly representative of the whole industry.

Is it not possible to raise the balance of the amount required during the next few days, and before the opening meeting of the Institution?

I sincerely trust a real effort will be made.

THOS. GLOVER,
President of the Institution of Gas Engineers.

Norwich, June 7, 1909.

The Relative Cost of Gas and Electricity.

SIR,—Regarding your reply to my last letter in your issue of May 25, and to which I regret extra pressure of business has obviated an early answer. You ask how it is I know the consumers quoted are getting a better light with electricity than with gas. I know it because they tell me so; and who should be a better judge?

As to your query regarding the allowance made for the gas-cooker, my statement was certainly not so clear as it might have been. The amount paid for cooking while gas was used for lighting was deducted from the consumer's total gas account, leaving the amount paid for lighting, with which figure the cost of electricity for a corresponding period was compared.

I have during the last ten days noted another instance where discrepancy of cost is such that it cannot be explained away by argument about trifles; and I append a copy of the actual letter received from our consumer. In this case, I give you (but not for publication) his name and address; and you can, by referring to the West Ham Gas Company, no doubt check the gas figures given. I would say that this particular consumer, before adopting electricity, complained to the Gas Company of the excessive cost of lighting. The meter was taken out and tested, and found to be absolutely correct. None but incandescent gas-mantles were employed; the most used being of the inverted type.

H. H. HOLMES, Sales Manager,
West Ham Corporation Electricity Department.

Stratford, E., June 4, 1909.

[ENCLOSURE.]

May 28, 1909.

Dear Sir,—Will you please send me a 35 c.p. Osram lamp, for which I will pay on delivery.

It may be of interest to you to know that I have been making a calculation as to the difference in the price of gas and electricity. My gas bill for the two quarters ending December, 1907, and March, 1908, amounted to £4 3s. 6d. for lighting. I had no gas-cooker. In August, 1908, the electric light was installed; and the electric lighting bill for the two quarters December, 1908, and March, 1909, amounted to £1 8s.—or, in other words, gas for lighting is three times dearer than electricity. At the same time, by using the Osram lamp, one gets as much, if not more, light than by the inverted gas-mantle.

To the Sales Manager,
West Ham Corporation Electric Supply.

[Mr. Holmes's letter does not appeal to us as being a complete answer to the editorial note to his communication of a fortnight since; but as to that readers perhaps will exercise their independent judgment. Mr. Holmes still declines to give the names and addresses of the consumers referred to in the previous correspondence, notwithstanding that the inquiry by us, assuming that there are no flaws in our correspondent's previous assertions, should do his department an immense amount of good. For the life of us we cannot understand why he refuses those names and addresses, but sends us a single one privately that he has obtained since the publication of his last letter. But to the present communication. Mr. Holmes does not know from personal observation that the consumers "are getting a better light with electricity than with gas;" but he knows it because the consumers tell him so. We can get a better light from gas than from electricity, spending the same amount of money. Mr. Holmes will testify to this fact now, because he knows it, seeing that we have told him, and who should be better judges of what we are able to do than ourselves? Now we are getting to somewhat nearer knowledge as to how the gas lighting cost figures were obtained. "The amount paid for cooking while gas was used for lighting was deducted from the consumer's total gas account, leaving the amount paid for lighting, with which figure the cost of electricity for a corresponding period was compared." It does not seem from this that the cooking gas and the lighting gas were separately metered; if not, what were the lines adopted in making an estimate of the quantity of gas used for cooking and the quantity used for lighting? We have no great faith in estimates of this kind made by the Sales Manager of any Electricity Department. Our correspondent is thanked for the testimonial he includes with his letter; and for the name and address of the writer. We are taking advantage of the permission to make inquiries into this matter. On the showing of Mr. Holmes in his letter a fortnight since, a "much higher illumination" can be obtained from gas for the same expenditure. Our correspondent knows, too, that, taking lighting efficiency on the basis of consumption, the writer of the testimonial is appealing strongly to his imagination when he says that "gas for lighting is three times dearer than electricity." If a gas consumer uses gas wastefully, uses it simultaneously in a greater number of rooms than he does electricity, uses it for a greater number of hours in the greater number of rooms, of course when he comes to economize electricity, and stands watchfully over his switches, he can produce all sorts of queer comparisons. Would this consumer believe it, that we can run a 25-candle power inverted bijou gas-burner for nearly 1000 hours for 2s. 8d. worth of gas in West Ham, as against about 350 hours, using a 25-candle power Osram lamp, with 2s. 8d. worth of electricity at 3d. per unit? How strange that his view should be that gas is three times dearer than electricity; and that ours should be the reverse, and both based on practical experience—ours perhaps on a far more extensive one, with both gas and electricity, than the consumer in question. One word to Mr. Holmes, and not to the consumer who has written this testimonial. We calculate that £4 3s. 6d. will purchase rather more than 31,000 cubic feet of gas at 2s. 8d.; but take the round figure. Also that £1 8s. will purchase 112 units of electricity at 3d. Taking for Osram lamps 800 candle-hours per unit, the 112 units would be equal to 89,600 candle-hours, which would only represent 2·88 candle-hours per cubic foot of the 31,000 feet of gas. But, of course, Mr. Holmes will believe the consumer gets as much light with the Osrams as with inverted gas-burners, because the consumer "tells him so, and who should be a better judge?" On the very face of the figures, Mr. Holmes must know that there is some other explanation for the difference between £4 3s. 6d. and £1 8s. than that (advanced by this consumer), that electricity used with Osram lamps gives a greater light for less money than gas used with inverted burners.—ED. J.G.L.]

New Use for Asbestos Fuel.

SIR,—It has been said, and rightly so, that there is no limit to the use to which gas, and its immediate surroundings, can be put; and to illustrate this, I might mention that in this office we have found a new (at least, I have not heard of it before) use for the asbestos fuel in the gas-fires installed in the office.

We find that the balls, when broken in half, make an excellent substitute for pumice stone for removing inkstains, grease, &c., from the hands.

L. F. D. CARTER
(late of Grafton Gas Company, Limited).

Correspondence Branch, General Post Office, New South Wales, May 1, 1909.

LEGAL INTELLIGENCE.

THE LATE GREENOCK GAS MANAGER'S CLAIM AGAINST THE CORPORATION.

In the Outer House of the Court of Session on Tuesday last, Lord Mackenzie closed the record and ordered proof, to proceed on a day to be afterwards fixed, in the action, already intimated, at the instance of Mr. William Ewing, formerly Gas Manager, against the Corporation of Greenock.

Mr. Ewing was appointed Gas Manager at Greenock in October, 1900; entering upon his duties in November. He resigned the post on Sept. 9 last; and his resignation was accepted. In the action, a claim is made for £1645 8s. as remuneration for work done by Mr. Ewing, which is said to have been outside his duties as Gas Manager. It is pointed out by the pursuer that, before his appointment, the defenders considered whether they should advertise for "a Gas Engineer to act as Manager," or for "a Gas Manager;" and by a majority they resolved on the latter. For many years Mr. Samuel Stewart had acted as Gas Manager, and also as Consulting and Resident Gas Engineer to the Corporation. He had a salary as Gas Manager; and for work he performed as Gas Engineer he received extra payment. Mr. Stewart resigned as Manager in March, 1900; and Mr. Chalmers was appointed to the office—Mr. Stewart being retained as Gas Engineer, at a salary of £100, with a retiring allowance of £150 as Gas Manager. Mr. Chalmers died in July; and Mr. Stewart, who had been acting as Manager during his illness, was asked and agreed to resume the managership, and did so till the pursuer was appointed. On his appointment, Mr. Stewart informed him of the extra payments he had received. When he was appointed, extensions at the gas-works were in progress, including the fitting up of a new installation of stoking machinery. In consequence of the illness of Mr. Stewart, the pursuer was asked to act as Consulting and Resident Engineer, which he did. He carried through and supervised the construction of the new stoking machinery, which was completed in April, 1901. The installation was not satisfactory, and proved so extravagant in working that in June the pursuer received instructions from the Gas Committee to do the best he could in the existing circumstances; and he was compelled to resort to hand labour. Mr. Stewart was never at the gas-works after November, 1900; but he was able to do some work in his house till his death in 1906. The pursuer specifies a large number of works which he did for the defenders, of an engineering nature, the fees he considers he is entitled to be paid for which amount to the sum sued for. Such works, he says, are never in practice

performed by a gas manager as such. It is the universal custom in all burghs in Scotland to employ an engineer to do such works; and of this the defenders were well aware. In view of this knowledge, the defenders, being desirous of getting a successor to the pursuer who could undertake and perform the duties of both offices, advertised, in October, 1908, for a Gas Manager "who will require to give his whole time and attention to the duties of the appointment," stating specifically that his salary (which they do not advertise, but ask applicants to say what they expect) "shall include all his work in connection with plans or engineering details with which he may be entrusted." The defenders knew quite well that the works the pursuer was doing were clearly outside the duties of a gas manager; and the pursuer all along expected he would be paid for them, and only undertook them in the belief that he would be paid, as Mr. Stewart was being paid at the time the pursuer took over his (Mr. Stewart's) duties. He frequently mentioned to the Town Clerk and to one of the Gas Committee the claim he would have when the whole extensions were completed, and only delayed making up his claim until the works should be completed. Owing to friction, however, between him and the Committee, he, on Sept. 9 last, was compelled to tender his resignation to the defenders; and on Dec. 24 he rendered the claim for which he now asks payment from the defenders.

Defenders say that the extra payments to Mr. Stewart were in terms of a special agreement entered into with him, and minuted; the designing and engineering of the new gas-works at Inchgreen (estimated to cost a sum not exceeding £50,000) being work of great magnitude and of quite exceptional character. In his letter of application for the post, the pursuer specially referred to his qualifications in the matter of designing, architecture, machine construction, and the carrying on of all departments of gas engineering; and in appointing the pursuer to the office, they relied on his rendering to them, in return for his salary, the services which he professed in his application to be able to perform, and which he offered to them in return for his salary. When he entered upon office, the pursuer took over, in ordinary course, the work of supervising the installation of new machinery. They admit that the installation proved unsatisfactory. Of an installation of generator retort-settings which the pursuer introduced into the works, they say that the settings were so faulty that they had to be superseded. The whole of the works in respect of which the pursuer's claim for special remuneration is made were within the ordinary scope of his duties, and were so regarded throughout, both by the pursuer and by them. During the whole period of his tenure of office, he never at any time intimated to them any claim, verbal or written, for special remuneration over and above his official salary, nor did he ever suggest that any part of the work was outside his ordinary duties. No special instructions were ever issued by them to the pursuer for any of the works; and he undertook the same in the ordinary course, without ever suggesting that he was entitled to special remuneration therefor. He regularly took payment of his salary, and granted receipts therefor without any reservation whatever. The defenders never employed the pursuer or agreed, expressly or by implication, to remunerate him in any other capacity than as their salaried Gas Manager. In point of fact, the works for which the pursuer now seeks special remuneration are all of the nature of services which the defenders were entitled to require of the pursuer as their Gas Manager, and are such as are performed without special charge by other persons holding similar appointments in other burghs.

FAILURE OF THE BRITISH CEROFIRM COMPANY, LTD.

Report of the Official Receiver.

In the last number of the "JOURNAL," it was briefly reported that the Official Receiver had issued particulars under the failure of the British Cerofirm Company, Limited, which showed gross liabilities amounting to £10,508, of which a sum of £6610 is expected to rank against the estate for dividend, and assets estimated to produce £987; leaving a deficiency of £5623. As regards contributories, the paid-up capital is returned at £110,100, to which has to be added the above-mentioned deficiency; making £115,723. The report and observations of the Official Receiver furnish the following particulars.

The winding-up order was made on the 23rd of February last, upon the petition of a creditor presented to the Court on the 8th of February. The Company was promoted by Mr. H. Sanguinetti, and was registered on May 24, 1907, to acquire and work a patent for the manufacture of incandescent mantles for Great Britain and the British colonies and dependencies (except Canada), and to carry on business as manufacturers of, and dealers in, incandescent gas-mantles. The nominal capital of the Company was £120,000, divided into ordinary shares of £1 each, of which 110,100 have been issued and allotted. The following have acted as Directors of the Company: Sir Charles J. Follett, C.B. (Chairman), and Messrs. F. E. Bodkin, R. T. Glover, Shurmer Sibthorp, Waldemar Bruno (for the Cerofirm Gesellschaft), J. H. Ward, H. P. Bodkin, and R. Freericks. Messrs. Glover, Bruno, Sibthorp, and Freericks resigned before the winding-up of the Company. The qualification of a Director was fixed by the Articles of Association at 500 shares. Sir Charles Follett received 500 fully-paid shares as a present from Mr. Sanguinetti, and Mr. Ward received a like number as a present from Mr. F. E. Bodkin. The vendors were the Cerofirm Gesellschaft, of Berlin, who, under an agreement dated May 14, 1907, agreed to sell the patent and give all necessary information as to the manufacture of the mantle for the sum of £82,500, to be satisfied as to £17,500 in cash, and as to £65,000 by the allotment of 65,000 fully-paid ordinary shares. Of the vendors' shares, 35,000 were transferred to the promoter, who, in addition, received £5000 of the cash consideration. The shares were partly transferred by him to certain Directors—viz., to Mr. Sibthorp 15,000, to Mr. Glover 3453, and to Mr. F. E. Bodkin 1250. The Official Receiver says it will be the duty of the Liquidator to inquire into the circumstances concerning these transfers, and to determine whether the transferees are under any liability in respect thereof.

It was agreed that Bruno, on behalf of the vendors, should instruct the Company in the process of manufacture. He appears to have only partially done so, and his method seemed to the Directors to be an infringement of a prior patent. It subsequently transpired that the vendors had adopted another process (that of Böhm) in the manufacture of mantles; and the benefit of this process they, at the instance of Mr. F. E. Bodkin, passed on to the Directors. The Company proceeded with the manufacture of the Böhm mantle, but the season's trade had been lost; and, though some of the Directors made considerable advances to assist the Company, the works were ultimately closed on the 8th of January last.

The total number of shares issued for cash was 35,100, of which Mr. Sibthorp took up 30,163; but most of the £16,063 which he paid thereon was, by an arrangement between them, actually found by Mr. F. E. Bodkin. The balance due upon these shares was secured by promissory notes of Mr. Sibthorp for £14,100. On the discovery of the fact that Bruno's mantle could not be manufactured, Mr. Sibthorp commenced an action against the Company for rescission of the contract to take the shares, on the ground that he had been induced to apply for them upon fraudulent misrepresentations. The action was compromised under an agreement dated July 24, 1908, the general effect of which was that the promissory notes should be cancelled, and that the Company should pay £900 to Mr. Sibthorp.

The validity of the last-mentioned agreement is, in the Official Receiver's opinion, open to question, and will have to be inquired into in the liquidation. The Directors who entered into it (Sir C. J. Follett and Mr. F. E. Bodkin) appear to be equally liable for the amount. To the last-named Director 10,000 shares were given for services rendered to the Company in procuring the Böhm patent. They were allotted to him at a meeting of Directors held on July 21, 1908. Under the Articles of Association, a Director may only receive by way of additional remuneration such sum as may be determined in general meeting; and it is probable, therefore, that the gift to Mr. Bodkin was invalid.

The assets of the Company consist of £12 os. 6d. in cash, book debts estimated to produce £1070 19s. 3d., unpaid calls of £2, and the Böhm patent, now valued at £830 and deposited with Mr. H. P. Bodkin on Oct. 14, 1908, to secure advances amounting to £895. Arrangements have been made to keep the patent working pending the possibility of a sale. It is not anticipated that the book debts will be fully realized. The machinery and stock were put up to auction by the Sheriff, under an execution for about £340 for a judgment creditor and rent, shortly before the winding up of the Company; and such goods as were left after satisfying the execution were sold by Mr. F. E. Bodkin for £350. The books of the Company are stated to have been imperfectly kept; and the figures given in the deficiency account are generally estimates only. Creditors returned as partly secured are for loans on security of letters patent £895, and bank overdraft and interest £2027 14s. The latter is guaranteed by the Directors only, and is not secured upon the assets of the Company. Preferential creditors are in respect of rates £18 8s. 8d.; salary, £3 10s.; and commission, £39 15s. 9d.

In the opinion of the Official Receiver, the failure of the Company is due to the fact that the original mantle purchased of the Cerofirm Gesellschaft proved to be valueless; and that the Böhm process was not obtained in time to be fully tested as to its commercial value, having regard to the crippled financial position of the Company. Mr. F. E. Bodkin states that the failure is also due, in a measure, to bad management at the works.

Embezzlement by a Sunderland Gas Collector.

At Sunderland last Wednesday, James Sparling, aged 37, a collector, was charged with embezzling two sums of money belonging to his employers, the Sunderland Gas Company; and he pleaded "Guilty." Mr. J. T. Green, who prosecuted, said prisoner had been employed by the Company as a collector for about six years. Part of his duty was to collect accounts and pay them over to the Chief Cashier daily. Recently there appeared to be large arrears due in the district where prisoner was collecting; and he was asked for an explanation. His excuse was that, owing to the depression in trade, his customers had not paid their accounts; but investigation showed that the prisoner had received the money, and had not paid it in. Only two cases would be taken. As prisoner was in receipt of a salary of £130 a year, he did not see what excuse he had. It was only fair to say, however, that prisoner had given the Company every assistance in the investigation of his deficiencies. Two customers then gave evidence to the effect that they had paid £2 3s. 2d. and £2 5s. to the prisoner. Mr. J. G. Kitts, Chief Cashier to the Company, said prisoner had not paid these moneys over; and the total deficiency was £98 14s. 9d. Prisoner had done his work well with this exception; and the Company had a fidelity bond on his account. Mr. Morton, for the defence, said prisoner had been in his previous situation twelve years, and bore an excellent character. He asked for leniency, especially on account of the prisoner's wife and two infant children. The Bench passed a sentence of four months' imprisonment in the second division.

Charge for Coal Trucks Left on Sidings.—In the "JOURNAL" for the 18th ult. (p. 460), we reported shortly a case in which the Midland Railway Company sought to recover from Messrs. Myers, Rose, and Co., Limited, certain sums arising out of a notice the Company had issued to the effect that after Aug. 1, 1905, they would charge 6d. per day per truck for coal-waggons kept on their "wait order" sidings for more than three days after the day of arrival, pending instructions from coal-factors as to their ultimate destination. The case came before Mr. Justice Channell and a Special Jury, and the latter found the charge reasonable. Judgment was accordingly entered for the Railway Company. We learn from the "Iron and Coal Trades Review," however, that the question will not be allowed to remain where the Jury left it, if there are any possible means by which defendants can procure a reconsideration of the verdict. Application is to be made for a new trial on numerous grounds, chief among which, perhaps, is the exclusion by the learned Judge of evidence which it is believed might have told strongly in favour of the defendants.

MISCELLANEOUS NEWS.

BIRMINGHAM CORPORATION GAS DEPARTMENT.

The Question of Salaries – Price of Gas for Manufacturing Purposes—Organization.

It may be remembered that at the meeting of the Birmingham City Council on the 11th ult. the annual report of the Gas Committee, which contained certain recommendations with regard to the fixing of the salaries of officers, &c., was under consideration. The report was given in the "JOURNAL" for the 4th ult. (p. 320). The recommendation which gave rise to the debate was as follows: "That the maximum salary to be paid to each of the Engineers-in-Charge at the Saltley, Nechells, and Windsor Street works be fixed at £1000 per annum, and that the Committee be authorized from time to time to advance such salaries up to such maximum figure." To this two amendments were submitted—one to defer the further consideration of the proposed increases of salaries until the General Purposes Committee had investigated and reported upon the subject, and the other to omit the words following "£1000 per annum," so as to give the Gas Committee power to fix the maximum salary, but not to advance to the maximum without bringing the matter before the Council. Both amendments, however, were lost, as was also the original motion; and, in the result, the Chairman of the Committee (Sir Hallewell Rogers) said the subject would have to be again considered by them. This has been done, and the following report has been issued for presentation at a special meeting of the Council to be held next Tuesday.

In view of the debate that took place in the Council on the 11th of May last, your Committee have again carefully reviewed this portion of their report. In the course of the debate, the Council did not question the scheme of organization then submitted, but were opposed to the fixing of maximum salaries for the several positions therein mentioned. Your Committee, therefore, again submit the scheme of organization, omitting all reference to the ultimate salary to be paid to the respective officers.

For the convenience of the Council, they outline hereunder the staff changes in May, 1908, and their proposals for the future administration of the Department. On May 28, 1908, a report was presented by your Committee which announced the retirement, on superannuation, of Mr. Henry Hack, the Engineer-in-Chief; and the sanction of the Council was asked to a scheme, as a trial, whereby the Engineers of Saltley, Nechells, Windsor Street, and Swan Village works, having qualified for more responsible positions, should be appointed Engineers-in-Charge of their respective works. In presenting the report, the Chairman indicated that, should the trial prove successful, the Committee would later bring a definite scheme before the Council.

The duties and responsibilities of the Engineers-in-Charge were carefully reviewed and extended by your Committee, and weekly conferences of the chief officials, including the Chief Chemist, were arranged as a means of ensuring concerted action in matters relating to the manufacture and distribution of gas, and of full consideration being given to all proposals for the improvement or extension of plant. The organization thus formed twelve months ago has worked so smoothly and well, that your Committee are unanimous in their opinion that its continuance is in the best interests of the undertaking. It is rendered valuable by the blending of the commercial with the manufacturing forces of the department; and the Corporation is safeguarded on the engineering side under this scheme by the retention and active co-operation of several trained and experienced Engineers.

The principal works of the undertaking are situated at Saltley, Nechells, and Windsor Street; and their magnitude will be appreciated when it is stated that collectively they use nearly 500,000 tons of coal, and 2,500,000 gallons of oil in the production of 6500 million cubic feet of gas per annum. There are five works in all belonging to the department, two of them comparatively small—one at Adderley Street in the city, in charge of a Superintendent, but under the control of the Engineer-in-Charge of the Nechells works; and the other at Swan Village, in the borough of West Bromwich, where manufacture is necessary for the supply of gas required for Wednesbury and Darlaston. As these works are some distance away from Birmingham, your Committee concluded that it was necessary to place them under the control of an Engineer-in-Charge, who would take part in the weekly conferences of the staff, and so enable your Committee to keep closely in touch with both manufacture and distribution in that portion of the area of supply. Each of the Engineers named has proved himself to be assiduous, progressive, and resourceful in all matters pertaining to his profession and in the discharge of his duties.

With regard to the Secretary, from the discussion which took place in the Council in May, 1907, it was apparent that the title of Secretary created an altogether wrong impression of the position held, and the duties performed, by that officer. Your Committee would point out that the office in question is one of great and increasing responsibility. The holder of the position is the chief executive officer of the department, who not merely performs ordinary secretarial duties, but advises the Committee on questions of policy, negotiates and completes the purchase and sale of materials aggregating in value considerably over half-a-million sterling per annum, supervises manufacturing costs and all other charges, and is responsible for the organization and efficiency of the large staff necessary for the conduct of the business.

The present Secretary, Mr. G. Hampton Barber, commenced his duties with the department in February, 1901; and during the intervening eight years your Committee have had the fullest opportunity of proving his business knowledge, powers of organization, devotion to duty, and capacity for work. The outcome of his labours is shown in the development of the undertaking; and the financial results during his term of office are set out in the statistics published with the annual statement of accounts. Your Committee recommend that Mr. G. Hampton Barber be appointed Secretary and Manager of the undertaking, and his salary increased from £1400 to £1600 per annum.

Your Committee further recommend that the appointment of the Engineers-in-Charge of the respective works be confirmed, and that the following increases of salary be granted:—

			Per Annum.
Mr. J. Foster.	Windsor Street works	..	From £650 to £700
Mr. W. Chaney.	Nechells and Adderley Street works	..	,, £625 to £700
Mr. F. J. Bywater	Saltley works	..	,, £425 to £600
Mr. T. H. Hack.	Swan Village works	..	,, £375 to £400

The foregoing increases to date as from the 1st inst.

The aggregate salaries of the Secretary, Engineers, Engineers-in-Charge, and Works Superintendents during the past ten years (1900 to 1909) are as follows: £5280, £5400, £5275, £4475, £4650, £4675, £4900, £5355, £5805, £4740. The quantity of gas sold has increased from 5700 million cubic feet in 1901 to 7000 millions in 1909; while the present increases recommended herein will only bring up the total to be paid to £5265, or less than was paid ten years ago.

Gas Used in Manufacturing Processes other than for Motive Power.

With reference to the memorial of the Birmingham Chamber of Commerce, in which the memorialists pray "for a reduction in the price of gas for heating irons and stoves in the operations of industry," your Committee report that they have for some considerable time had under consideration the question of the charges for gas used for manufacturing purposes.

Owing to the competition from producer gas now being experienced, it is necessary that town gas used for manufacturing purposes should be supplied at the lowest possible price; and it is important that the supply of gas for such purposes should, as far as possible, be retained by the Gas Department. It is difficult to estimate with any degree of accuracy the quantity of gas used for heating purposes in the various processes of manufacture within the area of supply; but it is very considerable, and, from careful calculation, it is anticipated that a concession of 1d. per 1000 cubic feet on the gas so used will represent a reduced charge to manufacturers of fully £5000 per annum.

Your Committee are of opinion that, having regard to the competition before mentioned, to the present favourable prices of coal and oil, and to economies that are being effected in the manufacture of gas, a reduction of 3d. per 1000 cubic feet may safely be made from the current lighting rates on all gas used in manufacture for heating purposes other than cooking; and they therefore recommend that, as from the next Michaelmas quarterly reading of the meters, the price of gas used for heating purposes as under shall be reduced 3d. per 1000 cubic feet off current lighting rates—viz., for japanning and lacquering stoves, muffles and furnaces, stills and plating-vats, blow-pipes and soldering-irons, ironing and pressing, and for other like purposes as may from time to time be approved by the Gas Committee.

If the recommendation of your Committee is accepted by the Council, regulations for the supply and registration of such gas will be drawn up; but it may be mentioned that manufacturers who purpose taking advantage of the present proposals will be required to provide, at their own cost, a separate service-pipe from the special meter required to register such gas to the point or points at which the gas is to be consumed, and that no gas for lighting or for purposes other than those scheduled or agreed to by your Committee must be taken from such special service-pipe. Otherwise the whole of the gas so registered will be charged for at ordinary lighting rates.

In the course of comments on the portion of the report referring to the question of salaries, the "Birmingham Gazette" says: "It will be seen from this report that the Gas Committee, in deference to the debate in the Council on May 11 last, omit all reference to the ultimate salary to be paid to their respective officers. The concession, of course, deliberately ignores a principle in municipal administration which deserves to be considered upon its merits and then either adopted or rejected. To keep so important a principle in a state of suspended animation is not pursuing an enlightened policy." The "Birmingham Daily Post" remarks: "The more the figures relating to the Gas Department are examined, the more apparent is the very able direction which has been brought to bear upon the business; and the Committee are entitled to look for a more than ordinary measure of confidence on the part of the Council in respect to the recommendations which they submit."

GAS DISCOUNTS AT BELFAST.

At the Quarterly Meeting of the Council of the County Borough of Belfast, the proceedings at which were reported in the "JOURNAL" for May 11 (p. 397), a proposition by the Gas Committee to allow increased discounts was referred back to them for further consideration. At the monthly meeting last Tuesday, the Committee again brought forward practically the same recommendation—namely, "That, in order to equalize the rate of discount over all consumers who use gas through ordinary meters, the discount of 15 per cent. at present allowed to consumers using up to and including 400,000 cubic feet per quarter on the same premises be increased to 20 per cent., thus making a discount of 20 per cent. on all accounts for gas consumed quarterly on the same premises through ordinary meters if paid in the gas office within one month from date of furnishing account."

Mr. J. A. Doran, the Chairman of the Gas Committee, in moving the adoption of the minutes containing the proposal, said that since the question was before the Corporation last month, there had been a decision of the House of Lords which had induced those members of the Committee who were opposed to the increase to change their minds and fall into line with those of them who were favourable to the bigger discount being granted; so that now they, as a Committee, were unanimous on the subject, and hoped that there would be no further opposition from the other members of the Council. The House of Lords' decision suggested that 1 per cent. on the outstanding capital might be

contributed towards the rates; but he thought they would try to do better than this. He was of opinion that they should continue to pay the dividends and sinking fund on stock issued for the erection of the new City Hall. This would amount to over £12,000 per annum, and would be between 3 and 4 per cent. on outstanding liabilities. If this could be done after they had provided a sufficient sum for depreciation and reserve fund for themselves, he was quite sure it would be appreciated by the ratepayers, as it would save them about 2½d. in the pound on the rates, and would, besides, be paying for the new City Hall entirely out of the gas profits. The decision of the House of Lords Committee to which he had alluded was of a somewhat sensational character. A Bill was promoted by the Salford Corporation; its main proposals being to raise £250,000 of additional capital, and to reduce the illuminating power from 17 to 14 candles. The Committee decided that the Corporation must not allocate to rate relief in any one year more than 1 per cent. on the outstanding debt of the undertaking. During the ten years ending March, 1908, the Salford gas undertaking paid in relief of rates from profits an average of £24,148 per annum, or 2·82 per cent. of the capital employed. The decision of the Lords Committee would reduce the amount that could be so applied by nearly two-thirds; and the Salford Corporation had taken so serious a view of the decision that they were thinking of withdrawing the Bill before it reached the House of Commons. If they accepted the clause, the Corporation would be thrown back upon utilizing the gas profits to duce the price to consumers. It was a curious thing that at Widnes, where this condition was already incorporated in a Local Act, the gas manufactured and supplied by the Corporation was the cheapest in the world. Widnes people testified that the observance of the rule had resulted in an enormous development of the use of gas—a development which could not have taken place if charges had been made that produced big profits for rate relief. Some time ago he (Mr. Doran) was laughed at when he said they ought to be able to reduce the charge in Belfast to 1s. per 1000 feet; but at Widnes they were supplying gas at this price, and he did not see why they could not do the same in Belfast. However, the Committee were not proposing to do this now. They only asked the Corporation to agree to a further increase in the discount of 5 per cent., which would mean from £6000 to £7000 a year. There was a sad matter to mention. About two months ago, they appointed as Gas Engineering Assistant, Mr. James Browne, a candidate from the South of England. While in their employ, he caught a cold, which developed into pneumonia, and caused his death.

Mr. Squire, in seconding, said he had objected to the increased discount when brought forward before; but circumstances had since been considerably altered owing to the decision of the House of Lords Committee. He was entirely in favour of the payment of interest and sinking fund on the City Hall being continued out of the gas funds, if the House of Lords permitted them to do so—which, however, he doubted. But they could not continue to do as they had been doing in allocating large sums to the relief of the rates. Of course, if they were not going to the House of Lords, they might continue to go on as they had been doing; but they were bound to go there in connection with the new gas-works, and it was absolutely necessary for them to meet the circumstances raised by the Lords' decision in the Salford case. The increased discount would mean a sum of £7000 a year; and this must be taken as given to the relief of the rates. They would not be allowed, any more than Salford, to allocate more than the 1 per cent. upon the capital; and they would also probably be limited in connection with the reserve fund. The whole tendency of thought, in fact, at the present time was that profits from municipal gas undertakings should go to the consumers. If he felt that they could help themselves, he would oppose this extra discount; feeling it was dangerous to tie them up so tight, just as they were going to undertake a new gas scheme which would not be very productive at first. It was unfortunate they should be compelled to sail so close to the wind. There was an opinion abroad that the gas-works were a mine of wealth. This was not so. He had gone into the question of profits for the last eight years. During that period they had made an average profit of £29,000 a year; ranging from a minimum of £5000 to a maximum of £45,000. As a matter of fact, the total of their average profit was only 5 per cent. upon their capital—by no means an extravagant amount.

Mr. Curley moved, as an amendment, that the minutes be passed omitting any reference to an increase in the discounts.

Mr. Johnston, in seconding, said he could not understand the attitude of Mr. Squire. He could not see why, because the House of Lords Committee had refused their consent to another Corporation's Bill, they in Belfast should take fright, and say that the House of Lords would do the same thing to them. The rates would be high enough, and they would require all the relief that could be given.

The amendment was lost—6 voting for it and 25 against; and the minutes were then passed.

A Good Year at Lincoln.—Referring to the operations of the gas undertaking during the past financial year, Alderman Wallis, the Chairman of the Gas Committee, told the members of the Lincoln City Council that he did not think they had ever had a better year; and the Committee had to thank the Manager (Mr. John Carter) and staff for the success obtained. It was a very great pleasure to work with them. The Committee had paid £3000 out of the profits to the district rate. During the present year they would be spending a large sum on new purifiers and on retort-house extensions.

Ratepayers' Claims in Respect of the Bermondsey Gas Explosion.—The Valuation Committee of the Bermondsey Borough Council have notified their willingness to receive a deputation of ratepayers from the vicinity of Grange Road and Crimscott Street, where the gas explosion took place at the close of last year. Several ratepayers have written to the Council asking for a rebate of rates in consequence of the alleged serious financial loss they have sustained through the road being closed for repairs. The Committee have informed the applicants that they are unable to find that the Council have power to remit any portion of the rate, and that any financial loss which they have suffered must be recovered from the party who is responsible for the explosion.

NOTTINGHAM CORPORATION GAS UNDERTAKING.

The Past Year's Working—Increased Profits.

The Annual Report of the Gas Committee of the Nottingham Corporation was issued last week, and it was to come before the City Council yesterday. The following are the salient features of the report.

The quantity of gas sold during the year ended the 31st of March was 1,980,416,700 cubic feet, compared with 1,995,780,900 cubic feet the previous year; being a decrease of 15,364,200 cubic feet. The total income amounted to £333,686, and the total expenditure to £226,746; leaving a balance of £106,940 carried to the profit and loss account. After deducting the interest on capital and sinking funds, and placing £2000 to depreciation of stoves, there is a net profit of £50,656 at the disposal of the Council, compared with £50,317 this time last year. The Committee recommend that £31,000 should be handed over to the Finance Committee in aid of the general district rate, and that the balance of £19,656 should be disposed of as follows: £3000 to be carried to the depreciation fund, £10,000 to the reserve fund, and £6656 to the renewals account.

The Committee express regret that during the year the market values of all residuals were adversely affected, in sympathy with the general depression in trade. Compared with the preceding year, the income from tar, sulphate of ammonia, coke and breeze, &c., showed a diminution of £8713. The increase in the rate of pay granted to almost every grade of employee, which came into force at the beginning of the financial year, cost the Gas Department a considerable sum. On the other hand, there was a substantial increase in the quantity of gas made per ton of coal carbonized; and the unaccounted-for gas shows a considerable improvement. These two factors are stated to be largely responsible for the increased profit, which is the largest on record.

Considerable sums were spent during the year in maintaining the works in an efficient state of repair. At the Eastcroft works, a large portion of the carbonizing plant was entirely rebuilt, and a new electric coke-conveyer installed. New bath-rooms and mess-rooms were built for the workmen employed on the works. The show-rooms at the Woodborough Road stores were entirely reorganized, and arrangements made with the leading gas apparatus manufacturers for a permanent exhibition of the latest and most up-to-date appliances. The £10,000 allocated in last year's account for the new retort-house at the Radford works has not yet been appropriated.

The Committee call the attention of the Council to the fact that in several German and Continental gas-works many great improvements have been made in carbonizing processes during the last two or three years; and they therefore decided that, before embarking upon any large expenditure, full inquiries should be instituted as to these new and improved systems of carbonizing and purification. Accordingly, the Chairman and Engineer were instructed to inspect and report upon several of the newest and most successful systems. New large gas-works where installations of the latest plant had recently been erected were inspected at Vienna, Königsberg, Zurich, Berlin, Mariendorf, Bochum, Potsdam, Paris, Amsterdam, Rotterdam, &c. After careful inspection and examination of the results submitted by the Engineers of the various works, it appears to the Committee that the German system of carbonization in vertical retorts is by far the most successful and economical method for the production of coal gas. Unfortunately, by this system, considerable difficulty is experienced in producing gas of sufficiently high illuminating power to comply with the standard to which the Committee are now working. Where, however, incandescent gas-burners are generally in use, the gas is quite adequate to meet all requirements; and in almost every large Continental city where enlargements had recently taken place in the gas-works plant, vertical retorts were found in operation. The heating value of the gas is quite equal to that produced by horizontal or inclined retorts.

The Committee also made an inspection of more recent installations of the system of producing gas in large coke-ovens at Vienna, Bochum, and Rotterdam, by which coal is carbonized in large bulk charges of 7½ tons each, and a coke is produced of a quality far superior to that obtained by ordinary gas-works processes. The patentees of this plant are prepared to guarantee results, both with regard to illuminating power and the quantity of gas produced per ton of coal, which are quite satisfactory to the Committee; and should their guarantees not be fully complied with, they are prepared to remove the whole of the plant at their own expense. They will also undertake that the whole of the plant, material, &c., shall be of British manufacture. The Committee are strongly of opinion that a small plant of this type, to produce 750,000 cubic feet of gas per day, should be erected at the Radford works at a cost of about £13,000.

Inspection was also made by the Committee of a system for the purification of gas which was installed at the Königsberg Municipal Gas-Works. It is confidently anticipated that this process, when perfected, will completely revolutionize existing methods of gas purification; but at present the Committee are not prepared to recommend its adoption in Nottingham.

In conclusion, the Committee express the hope that in the near future advantage will be taken of the new Bulwell Hall Estate for the concentration of the whole of the gas-works plant and apparatus on one site; for it is anticipated that by this arrangement they will eventually be able to make a substantial reduction in the cost of gas manufacture. They are of opinion that some reduction should be made in the price charged for gas supplied through prepayment meters; and they therefore propose to make a rebate of 1d. in the shilling on all money collected from these meters after the 25th of September next.

Appended to the Committee's report is that of the Engineer and General Manager (Mr. J. H. Brown) on the works and manufacturing operations, &c., last year. It contained the following particulars.

The plant, buildings, &c., and the machinery generally, are in a good and efficient state of repair; the amount spent on the annual repairs and maintenance of works being £37,691, compared with £36,009 for the year 1907-8. The reconstruction of the carbonizing plant in the electrically operated retort-house at Eastcroft was completed during

last autumn; and it was in continuous operation throughout the past winter, with satisfactory results. The whole of the new plant in this house is now complete, with the exception of a small portion of the coke-screening plant. Mr. Brown says this new carbonizing plant is an improvement on previous installations, and has considerably reduced the amount of arduous work and materially improved the conditions of labour in this retort-house.

At Basford, the carbonizing plant continues to give improving results. Owing to the increased yield obtained per ton of coal carbonized, it was for the first time not necessary to put into operation the older plant in the No. 1 and No. 2 retort-houses. The compressed air stoking-machines and coke handling and conveying plant, &c., operating No. 3 retort-house have been maintained in efficient working condition. The carburetted oil-gas plant was again found to be of considerable assistance in meeting sudden demands from fogs or other causes, though it was used to a less extent than the previous year.

The carbonizing results, which have gradually improved from year to year, again show record figures. During the past year, 186,374 tons of coal and 54,775 gallons of oil were carbonized, yielding 2,085,306,000 cubic feet of gas, or equivalent to a production of 11,123 cubic feet per ton of coal, against the previous highest make of 10,870 cubic feet for 1907. The gas sold per ton of coal increased from 10,240 cubic feet in 1907-8 to 10,564 cubic feet last year. This is by far the highest figure in the history of the undertaking, and is 1418 cubic feet more than the quantity of gas sold per ton of coal carbonized for the year 1902. The improvement represents a saving on the past year's figures, compared with 1902, equivalent to 29,065 tons of coal. The carbonizing cost per 1000 cubic feet of gas sold was reduced from 2·7d. in 1907-8 to 2·39d. in 1908-9; this figure again establishing a new record.

In the distribution department, special difficulty was experienced with breakages of mains, due to subsidences and other similar causes. A considerable amount of money has been spent in searching for leakages, and making good broken mains. A very satisfactory reduction has been shown in the amount of unaccounted-for gas—from 5·36 per cent. to 5·03 per cent.—again the lowest figure on record.

The chemical works and plant were maintained in efficient working order during the year. The sulphuric acid plant continues to give very satisfactory results; 2157 tons of acid having been made from spent purifying material produced on the three gas-works. The sulphate of ammonia plant at Basford deals with the whole of the ammoniacal liquor produced at the gas-works, though it is being operated at considerably above its normal capacity. Unfortunately, in spite of improved working results, the great reduction in the market values of all chemicals, which have fallen in sympathy with the general trade depression throughout the world, has materially reduced the income from residuals; one product—carbolic acid—having fallen 40 per cent. in value during the past twelve months. The return from coke, which showed great improvement during the year 1906-7, has fallen from £40,395 in 1908, to £37,564 in the past year. Owing to the reduction in the market value of sulphate of ammonia, the receipts are down from £18,649 to £16,580. The total receipts for residuals for the year are therefore less by £8714.

The rate of wages paid to almost every grade of workman was advanced very considerably at the commencement of the year under review. This increase has been felt most in the carbonizing and distribution departments. The coal cost the department £95,018, against £98,446 in 1907-8. This reduction (£3428) is due to the smaller quantity carbonized owing to the higher yield of gas obtained per ton. The reduction in the receipts from residuals, which was foreshadowed in Mr. Brown's preceding report, considerably more than counterbalances the saving effected in coal. There are, however, he says, indications of some slight improvement in the value of chemicals during the coming season; and it is confidently anticipated that a saving will be effected in the purchase of coal required for the coming year. Mr. Brown thinks it probable that the new tax on petrol will again bring into extended use benzol for the propulsion of motor vehicles, which would have a beneficial effect on the market values of the products made at the Giltbrook chemical works; and the proposals for the tar painting of main roads will remove a considerable quantity of this material from the chemical trade, and favourably affect market values.

In spite of an increase in the total number of consumers, the consumption of gas shows a decrease of 15,364,200 cubic feet, owing to the depression in trade, the very mild winter, and the almost phenomenal absence of fog. This decrease was undoubtedly accentuated, Mr. Brown says, by the extended use of incandescent gas-burners, and by the removal to Coventry of one of the large local cycle company's works. The saving effected by the adoption of incandescent gas-burners in the public lamps is shown by the following figures.

Year.	No. of Lamps.	Total Consumption of Gas.
1902	5787	115,026,500 cubic feet.
1909	7222	88,134,800 ,, ,,

The amount of gross profit realized by the gas undertaking has risen from £75,907 in 1902 to £106,940 last year.

The prepayment meters in use continue to increase in proportion to the total number of consumers; being 43·73 per cent. in the past year, compared with 41·48 per cent. in 1907-8. This increase has again raised the average price per 1000 cubic feet of gas from 2s. 6·27d. to 2s. 6·4d. Deducting the extra amount charged for rent for slot meters and cookers supplied to these consumers, the average price obtained per 1000 cubic feet of gas sold is 2s. 4·62d.

The following statement of working results will show the development of the gas undertaking since 1902:—

	1902.	1908.	1909.
Coals carbonized (tons)	196,681	194,890	187,469
Gas sold (thousands)	1,798,779	1,995,781	1,980,417
Do. per ton of coal	9,146	10,240	10,564
Average price of gas	2s. 8·93d.	2s. 6·27d.	2s. 6·4d.
Gross profit	£75,907	£106,250	£106,940
Interest and sinking-fund charges, &c.	50,891	53,933	54,284
Net profit	£25,016	£52,317	£52,656
In aid of rates	24,516	30,000	—

The concluding portion of the report relates to the distribution department. It shows that the total mileage of mains is 377·49—an increase of 6·78 miles during the year. The number of meters fixed to the 31st of March (including 465 lamp meters) was 72,506; being an addition of 2960. Of these, 69,739 belong to the Gas Department and 2767 to the consumers. The demand continues for prepayment meters; and at the end of the financial year, 31,711 of them were in operation—an increase of 2853. There were 3037 new services laid in the past year, compared with 3350 before. Mr. Brown says the application of gas for trade and domestic purposes other than lighting continues to increase. There are in use about 29,408 cooking-stoves, 14,183 gas-fires, and 688 gas-engines, besides a large number of other appliances of almost every description which have not been numbered. Of the 29,408 cookers in use, 9626 are rented from the department, and 19,080 are supplied with the automatic meter rent free.

Appended to the report is a table showing the comparative workings per ton of coal and per 1000 cubic feet of gas sold for the past and the preceding year; and this is followed by the accounts of the Gas Department in the usual form.

ST. HELENS GAS UNDERTAKING.

The Past Year's Results.

It was stated in the "JOURNAL" for the 18th ult. (p. 462) that the St. Helens Gas Committee had had before them the results of the working of the gas undertaking for the year to March 31, and that, after providing for interest, sinking fund, and other charges, the net profit amounted to slightly over £9100. Out of this sum, the Committee decided to vote £5000 to the borough fund in relief of the rates. The report of the Committee on the past year's operations of the department was submitted to the Town Council last Wednesday, when the Council, through the Mayor, expressed great satisfaction at the results.

Dealing first with the public lighting, the Committee remarked that the year under review was one of considerable activity in this direction. The lighting arrangements had been carefully revised by them from time to time, including the improved lighting of Victoria Square, without increasing the lighting rate. The incandescent system had been extended to 166 lamps, giving a total of 886 lamps so fitted. There were 68 additional lamps erected in various parts of the borough; making the total number now lighted 2082. The report continued: "The amount provided in the estimate was found barely sufficient. The Committee, however, are pleased to be able to extend the incandescent system to several parts of the borough (while levying the same lighting rate for the current year), making extended use for this purpose of the new combination of inverted light devised by the Engineer (Mr. Samuel Glover), the lanterns for which are being manufactured in the town."

The total quantity of gas made during the year was 465,252,060 cubic feet—an increase of 4,387,760 cubic feet, or 0·95 per cent., over the previous year. The unaccounted-for gas amounted to 3·3 per cent., which the Committee pointed out was a very low figure considering that the whole district was so much disturbed by mining operations. The total amount of fuel used in the manufacture of gas (including coal, cannel, and oil) was 46,542 tons; and the illuminating power of the gas supplied was equal to 17·79 standard candles. There were 663 consumers' meters added during the year, which brought the total number now at work up to 16,310. Close upon 3½ miles of gas-mains and 764 service-pipes were laid in the twelve months; and 772 cooking-stoves, &c., were fixed—bringing the total number of stoves of all kinds in use up to 14,210. The quantity of gas used in engines was 23,535,000 cubic feet; the number of engines now at work being 124, amounting to a total horse power of about 1759. The capital account is £334,221, of which £196,622 has been repaid, leaving a present debt on capital account of £137,599.

The net income from gas sold was £47,102; while the sum collected from coin-meters was £21,708 1s. 6d.—equal to 46 tons weight of copper, and 5,148,443 coins. The income from bye-products was £21,639 net, which the Committee said they believed to be the highest percentage of income recovered from bye-products in the country—being more than the cost of coal and oil for enrichment. The total wages paid by the department during the year were £16,685.

After referring to the net profit (already noticed), the Committee went on to say: "During the year, the process for the removal of naphthalene from the gas continued to work successfully; the trouble to both consumer and supplier (which used to be very great) having been entirely removed. During the period under review, the new method of carbonizing coals in vertical retorts (which our Engineer, in conjunction with West's Gas Improvement Company, has introduced by arrangement with the Committee) has been worked for a considerable time; and the Committee have taken great interest in the development of the new system, and have had it officially tested on behalf of the Corporation by a competent London expert, who has reported very favourably of the system and the way in which it is worked. This new system of setting retorts is likely to prove of particular value to the Gas Estate, as it is the only hope we have of being able to increase the production of gas at the old works; and our Engineer is to be congratulated upon having taken another important step in advance."

Opposition to the Coatbridge Gas Order.—As mentioned in our "Parliamentary Intelligence" last week, a petition of the Provost, Magistrates, and Town Councillors of Coatbridge has been presented to the House of Lords, praying them to set aside the Gas Company's Order as settled by the Board of Trade. Besides objecting to the lowering of the illuminating standard and to the new system of testing, the Council are desirous of introducing a clause making it possible to test the calorific value as well as the candle power of the gas, and penalizing the Company under certain circumstances. They also require the Company to write-back to their profit and loss account certain sums in the reserve fund.

BOLTON CORPORATION GAS UNDERTAKING.

Report and Accounts of the Gas and Lighting Committee.

The Gas and Lighting Committee of the Bolton Corporation have submitted to the Town Council their report and accounts for the year ended the 31st of March. In the former, they state that during the year the rebuilding of the retort-house at the Lum Street works, to which reference was made in their preceding annual report, was completed; and they add that in the near future the costly work of altering the retort-benches into the regenerative system of firing, and providing stoking machinery, will be imperative. A new purifying-house and new condensers will also have to be erected in order to keep pace with the latest improvements and cheapen the cost of gas manufacture.

The Committee submit the following statistics of working for the past and the preceding year:—

	1909.	1908.
Coal and cannel carbonized, tons . .	94,802 ..	99,635
Average cost per ton	11s. 7d. ..	11s. 2¼d.
Percentage of cannel used	1·02 ..	1·33
Gas made, thousand cubic feet . . .	970,577 ..	1,022,493
,, ,, per ton of coal carbonized .	10,238 ..	10,262
Gas accounted for, cubic feet per ton .	9,700 ..	9,716
Gas unaccounted for, per cent. . . .	5·25 ..	5·32
Maximum quantity of gas supplied in 24 hours during the year, cubic feet .	6,047,000 ..	5,714,000
Minimum quantity supplied, ditto . .	797,000 ..	879,000

The accounts accompanying the report show that the sale of gas produced £112,367; residuals, £38,135; the revenue from the gas-fittings trade was £1163; and cottage rents and the receipts from the electricity and fittings departments brought up the total to £152,877, compared with £160,568 in the year 1907-8. The expenditure on the manufacture of gas was £80,896; on distribution, £9936; on management, £2055; and the total expenses were £102,479, against £103,973. The amount carried to the net revenue account is £50,398, compared with £56,595. The net result of the year's working has been to secure a disposable balance of £24,844, out of which the Committee have voted £17,500 in aid of the district rates, and carried the balance of £7344 to the credit of the reserve fund account.

Since the transfer of the gas-works to the Corporation in 1873, there has been made a total gross profit of £1,766,301, which has been disposed of as follows: Annuities, £404,686; interest on loan debt, £151,049; dividend on stock (since 1886), £212,584; sinking fund, £79,238; reserve fund, £387,168; voted in aid of rates, £531,576.

MARKET HARBOROUGH GAS UNDERTAKING.

Annual Report of the Manager—Reduction in Price.

At the Meeting of the Market Harborough Urban District Council last Tuesday, the report of the Gas Engineer and Manager (Mr. A. T. Harris) for the past financial year was presented. It showed that the balance of £1565 on the capital account had been spent in the erection of new carbonizing plant, coke-breaking machinery, &c.; so that the whole of the £49,000 borrowed in respect of the undertaking has been expended. The revenue for the year was £9131, the expenditure £6388; leaving a gross profit of £2743. Deducting the interest on loans and the payment into the sinking fund, amounting together to £2101, there was left a net profit of £642. The balance on the profit and loss account at the close of the year was £2607—an increase of £482, after allocating £160 to the district rate. Coal cost £3417; being £105 more than in the year 1907-8. This was due to the increased quantity of gas produced. The make per ton of coal carbonized was 11,567 cubic feet. The quantity of gas made was 51,174,000 cubic feet—an increase of 1,548,000 cubic feet; and the sales per consumers' meters and public lamps amounted to 47,202,000 cubic feet—an increase of 1,435,900 cubic feet. The net receipts from private consumers were £6441—an increase of £103; and the income from prepayment meters showed a rise of £242 during the year. The total receipts from this source were £1546; while the income from ordinary meters showed a decrease of £139, due to a slightly lower consumption and a reduction in price of 1d. per 1000 cubic feet in the two winter quarters. The net receipts from the sale of residual products amounted to £1967, or £80 less than before, owing to the lower price obtained for coke, tar, and sulphate of ammonia. The number of ordinary meters in use at the close of the year was 766, and of prepayment meters 574—together, 1340; while the number of cookers was 764. Mr. Harris concluded his report by saying that, having regard to the heavy charges incurred in maintaining the works and plant in a proper state of efficiency, together with the lower prices realized for residuals, the financial results of the past year's working compared favourably with those of former years.

In moving the adoption of the report, the Chairman of the Gas Committee (Mr. G. G. Gardiner) expressed his pleasure at being able to lay before the Council a satisfactory record of the past year's working. Briefly, the net result was that, after payment of interest on loans and repayment of principal, amounting to £2101, and transferring £160 to the relief of the rates, the financial position had improved during the year to the extent of £482. Having regard to the lower average prices realized for residuals, and a portion of the coal having been purchased at the previous year's high price, together with a reduction of 1d. per 1000 feet in the price of gas in September, it was a matter of congratulation that the profits had been so well maintained; being only £26 less than last year. Although during the year the department lost one large consumer through the Midland Tannery Company's works being closed, the increase in the consumption of gas had been well maintained, which was not the general experience in most towns. He said it was a source of satisfaction to the Committee to be able to announce a further reduction of 2d. per 1000 cubic feet; making a total of 3d. within the year, and representing a concession of £440 to the consumers. This would make the net prices 2s. 4d. to a fraction over 2s. 9d. per 1000 cubic feet to ordinary consumers, according to quantity consumed, and an all-round flat-rate of 1s. 9¾d. for all gas employed for power and industrial purposes. Having regard to the long distance the works were situated from the gas coalfields, he ventured to remark that these prices compared very favourably with those of any town of a similar size in the country, more especially taking into account the heavy standing charges to meet interest and the repayment of loans, which amounted practically to 1s. per 1000 cubic feet of gas sold. The year had been an anxious one, especially to the Manager, as the erection and working of the new semi-vertical (45°) retorts required a considerable amount of time and attention, and caused anxiety as to the results. Though the productive capacity of the plant had not quite reached anticipations, the make of gas per ton of coal carbonized with this particular setting had been quite satisfactory, and had undoubtedly been a contributing factor to the success of the past year's working. As the result of the experience gained during the past winter, further improvements would shortly be made, which it was expected would increase the efficiency of and economy in production realized by the system. It was gratifying to him personally, as Chairman of the Gas Committee since the undertaking was acquired, to present for the tenth successive year a favourable report, and to be able again to recommend some tangible advantage to the consumers. It might be interesting to state that during the ownership of the works by the Council the make of gas had increased from 31 million cubic feet per annum to 51 millions; also that during this time the average price had, with the reduction now recommended, been reduced 4d. per 1000 cubic feet to ordinary consumers, 1s. per 1000 cubic feet for power and other industrial purposes, while a corresponding reduction in the price charged per lamp for the public lighting had also been made, and the lighting of the district vastly improved. In conclusion, Mr. Gardiner tendered, on behalf of the Committee and himself, their heartfelt thanks, first to the Manager, who had worked so hard to attain the present position, and then to the staff and the whole of the workmen, for the excellent results obtained.

The Chairman of the Council (Mr. Sharman Goward) said it was a matter for congratulation to the Council and to the whole district that the gas-works were in such a flourishing state; and he should like to add his congratulations to Mr. Gardiner, to the Committee, and to the Manager on the good results shown. He considered them excellent. The report was adopted.

NEWBURY CORPORATION GAS UNDERTAKING.

The report and accounts of the Newbury gas undertaking for the past year, which have been submitted to the Town Council, show that the total sum owing at the end of March was £33,610. Loans paid off totalled £5482. The receipts for the year amounted to £12,708, and the expenditure to £9869; leaving a balance to profit and loss account of £2839. After deducting sinking fund instalments, interest on mortgages, and other charges, there was a surplus on the year's working of £529. This was more than absorbed by charging the profit and loss account with extensions of mains, services, and fittings, and stoves fixed. During the year 6141 tons of coal were carbonized; and the total quantity of gas made was 65,025,000 cubic feet, of which 2,613,400 cubic feet were unaccounted for. Expenditure on repairs and maintenance cost £1043; £238 had been spent on stoves let out on hire; while new mains, meters, and prepayment meter fittings had cost £482.

In moving the adoption of the report, Alderman Smith said the Gas Committee felt that the undertaking was going steadily on in its output; but the area of the town was extending, and the expenses of supply increased. The quantity of gas unaccounted for was rather more than last year; but there were good reasons for this, and 4 per cent. in loss was fair and justifiable. There was very little variation in the revenue account. Their profits were less by £650; but this was explained by their having to pay £450 more for coal, £230 for overhauling the boilers, and other extra work, absorbing some £759 altogether. The surplus of £529 had been utilized in paying for extended mains and other improvements, rather than borrowing further money for the work. The Committee, who were thoroughly satisfied with the report, felt that the undertaking had reached its limit in the direction of relieving the rates, and hoped the Council would agree to the principle that in future profits should be devoted to meeting current expenses. He thought that with gas at 2s. 10d. per 1000 cubic feet, and discounts which amounted in the course of a year to nearly £600, there was little to complain of.

Mr. Stradling said he could not agree that the accounts were satisfactory, and added that the balance-sheet was stamped with the imprint "No progress." The report was, however, passed, with only one or two dissentients.

THE PAST YEAR AT LANCASTER.

Mr. Armitage's Report.

Mr. Charles Armitage, the Engineer and Manager of the Lancaster Corporation Gas-Works, in his report on the operations for the year to March 25, says that the total receipts, including bank interest, less commission, were £28,875, and the expenditure, £19,879; leaving a gross profit of £8996. This sum has been disposed of as follows: Interest on stock and mortgages, £3559; redemption fund, £1814; income-tax, £589; borough fund, £2000; reserve fund, £1034. The reserve fund now amounts to £12,046. A sum of £1814 has been added to the redemption fund, making, with interest accrued, £34,054. Nothing has been added to capital account during the past year; but the sum of £1556, cost of new mains, services, meters, and prepayment stoves, has been charged direct to revenue account. The receipts for gas through ordinary meters were £14,351—a decrease of £844. Of this, £687 is due to the reduction in price, and £157 to decreased consumption. This decrease, no doubt, has been caused by many consumers

adopting incandescent lighting, which gives greatly increased illumination for a smaller consumption. Of prepayment meters, 3003 have been fixed up to date; and the receipts for the past year amounted to £4623—a decrease of £5, notwithstanding an increase in consumption of 3,080,646 cubic feet. To the public lamps, 16,636,766 cubic feet of gas were supplied free of charge. This is equal to a sum (at 1s. 11d. per 1000 cubic feet net) of £1594. The average price received per 1000 cubic feet of gas sold was 1s. 10·41d. The low net cost of gas—viz., 10·72d. per 1000 feet sold—will compare favourably with any works in the United Kingdom, and can only be equalled by a very few works which are more favourably situated for the purchase of coal and sale of coke. The average cost of coal (slack) was 11s. 8·79d. per ton, against 12s. 4·98d. the preceding year. Coke contributed in return 5s. 8·87d., and products from tar and ammoniacal liquor 3s. 2·70d., making a return for residual products of 8s. 11·57d. per ton of coal carbonized, or 76·40 per cent. on the cost of coal. Products had not maintained their prices since his last report, but had a steady tendency at present. The working statement, concludes Mr. Armitage, shows that the total quantity of gas sold and used at the works and offices during the last twelve months was 205,496,534 cubic feet, an increase of 1,674,471 cubic feet, or 0·82 per cent. Referring to the remarks in his last report regarding extensions to the carbonizing plant, he says he has delayed formulating a plan, as the consumption of gas is practically stationary at present. This matter will, however, require consideration in the near future.

The working statement shows that the coal (slack) carbonized was 20,195 tons; the make of gas per ton was 10,451 cubic feet; and the illuminating power supplied was 16·32 candles. The unaccounted-for gas was 2·64 per cent. The coke made was 13 cwt. per ton of coal; and of this 88·14 per cent. was available for sale. 11·86 per cent. being used for fuel.

WEST BROMWICH GAS UNDERTAKING.

At the Meeting of the West Bromwich Town Council last Wednesday, the Chairman of the Gas Committee (Alderman J. E. Wilson) referred to the accounts of the Gas Department for the past financial year, as presented by Mr. Hudson, the Borough Treasurer and Secretary to the Gas Committee (see *ante*, p. 592). He said he thought the reduction of £836 in the gross profit required some explanation. They had had to bear increased prices of coal during the last two or three years, and they had borne them fairly well. But they could not fight always successfully against depression in trade. The consumption of gas had decreased some 12 million cubic feet, which was a very serious figure. But he believed that in the previous year there was an increase of 13 millions; so that they were not far behind, if they took a series of years. On the net profits there was a drop of nearly £800. The total decrease in the revenue in connection with the sales of gas was £1510. Though there were more consumers, they had apparently been very economical. With regard to the residual products, they had sold 1862 tons less coke, equal to £680, also 20,973 gallons less tar (£326), and 159,478 gallons less ammoniacal liquor (£472); the decreased revenue in respect of these sales being £3097. The income from fittings was £109 less. In connection with the decreased expenditure, the principal items were coals, £294; fuel for firing, £287; purifying, £310; wages, £344; maintenance, £587—the total decrease being £2370. The Committee proposed to transfer to the extensions suspense account £556. He might mention that this account, which at one time stood at £23,000, was now less than £7000; and the Committee hoped to completely wipe it off in a few years. He moved the approval of the accounts.

Mr. Halford, in seconding the motion, expressed his appreciation of the work of the Committee and their officers, who, he said, were doing their best for the undertaking. He thought the Committee should consider what steps could be taken to increase the demand for gas; and he suggested that some concession might be made to the people who used gas for cooking purposes, so that they might be encouraged to employ it more freely. Alderman Blades said the gas undertaking had been thoroughly well managed; and it spoke volumes when the Chairman of the Committee could get up and refer with such equanimity as Alderman Wilson had done to a loss of £800. In reply, Alderman Wilson said the Committee did not think it would be wise at the present time to further reduce the price of gas. He added that the Committee were very much indebted to Mr. Hudson and Mr. Copp (the Gas Engineer) for the success of the undertaking. The accounts were approved.

KENDAL GAS AND WATER DEPARTMENTS.

Prospective Concessions to Gas Consumers.

At the last Meeting of the Kendal Town Council, the Chairman of the Gas and Water Committee (Alderman Monkhouse), in moving the adoption of their minutes, furnished particulars in regard to the working of the Gas and Water Departments in the past financial year.

Taking first the Gas Department, Alderman Monkhouse said the past year had been a successful one. The gross income had been £14,069, and the gross profit £3804. The net profit had been £1064; and with £297 balance from last year, there was a disposable balance of £1361. The quantity of gas made was 82,823,000 cubic feet, of which 76,990,600 cubic feet had been sold. This showed a decrease of 1,509,300 cubic feet; but two or three former large consumers now had their own suction-gas plants, and of these the department had not yet felt the full effect. On the other hand, the Corporation would partially recoup themselves for this loss of consumption by the projected supply of gas to Burneside. In the fourteen years of the Corporation's possession of the gas-works, they had been able to vote £6050 towards the relief of the rates. He believed that the consumption of gas by means of cookers would be a growing source of revenue. He hoped soon to propose a reduction in the price of gas, believing that this could not be much longer delayed. There was no reason why the cost should not be lowered, as they could now afford to do it; and every time they had taken a step in this direction, and been generous to the consumers, they had improved their results. He looked forward, too, if not to the abolition of rents for gas-cookers, at all events to their reduction, especially to those customers who had had them in their houses for ten years or more, and who, he thought, were entitled to relief. Their Manager (Mr. W. R. Wilson) had "gone one better" even than Mr. Thomson, his predecessor. Formerly there was an enormous pile of what appeared to be nothing better than scrap-iron; but these cookers Mr. Wilson had had furbished up, and every one had been made equal to new, and been sent out for use. This year the Committee were hoping to effect a saving in their coal contracts. With an ordinary year's working in the current year, it was not too much to say that they would again be able to assist the rates to the same amount as before, and, in addition, give some relief to consumers and to the users of cookers.

Turning to the Water Department, Alderman Monkhouse said the accounts showed a surplus profit of £253, which was gratifying, as in some years they had had deficits. The water revenue last year was £3558, compared with £2796 in the year 1896. He should like to allude to the carelessness and indifference of the public as to the use and waste of water. People seemed to think that because it was only water it did not cost anything. They forgot that there was a sum of about £2500 a year to pay for interest and sinking fund. While the Committee did not desire to be in any way stingy in regard to the use of water, they did not wish to see it wilfully wasted.

Appreciation was expressed of the work of the Committee, the Chairman, and the Manager; and the minutes were adopted.

TEIGNMOUTH GAS UNDERTAKING.

Satisfactory Report.

The Gas Engineer and Secretary of the Teignmouth Urban District Council (Mr. J. A. Gray) presented last Tuesday his report for the year ended the 31st of March. He stated that there was a larger gross profit in the period named than in any previously recorded in the history of the gas undertaking. The amount was £2247, or 14 per cent. on the present capital debt. Of this sum, £984 was absorbed for the repayment of loans, and £527 for interest. The net profit for the year was consequently £736. The credit balance on the revenue account amounted to £2310; having risen from £1574 at March 31, 1908. On March 31, 1903, there was a deficit of £1283; so that financial improvement to the extent of £3593 had been effected in the intervening six years. Mr. Gray remarked that the repeated reductions in the price of gas, which totalled 1s. 1d. per 1000 cubic feet, had not diminished the profit producing powers of the department, but, on the contrary, had exercised a beneficial effect by stimulating the consumption of gas—thus reducing the working and capital charges per 1000 cubic feet. The economy of production was to a large extent dependent upon the amount of the consumption; and the cheaper the supply became, the brighter the prospects for further development and the maintenance of a stable position. The average make of gas per ton of coal carbonized last year was 10,237 cubic feet, which was 58 cubic feet per ton more than in the previous year. The total make was 38,974,480 cubic feet—an increase of 2 per cent. on the production in 1907-8. Of the total output, 27,742,000 cubic feet were sold to ordinary consumers, or an increase of 7·7 per cent. on the preceding year; 3,721,000 cubic feet to slot-meter consumers, or 7·8 per cent. more; 667,300 cubic feet were used on the works; and 5,146,000 cubic feet were consumed in the public lamps. The unaccounted-for gas amounted to 4·4 per cent. of the registered output. This, said Mr. Gray, was a very low and satisfactory figure, and represented a reduction of 4·5 per cent. on the previous year's return. It was equivalent to a saving of 170 tons of coal. The revenue from the sale of gas was £200 higher for ordinary consumers, and £60 for slot-meter consumers, than in 1907-8. The average consumption per slot-meter consumer was 11,457 cubic feet.

The Gas Committee recommended that the price of gas should be reduced from 3s. 6d. to 3s. 3d. per 1000 cubic feet as from the 30th inst.; and Mr. Denny, moving the adoption of the recommendation, said the Gas Manager's figures showed that the undertaking was in a very satisfactory position. Mr. Francis proposed that the question of the reduction of the price of gas should be referred back to the Committee for further consideration. If the consumers had gas at 3s. 6d. per 1000 cubic feet, there was not much to complain of; and if the Manager, by his ability, could show a considerable profit, it should be applied in reduction of the rates, as was done in other towns. The Chairman (Mr. F. Slocombe) said the Gas Committee had considered the point, and had come to the conclusion that it would be wise to look into the question of using the profits for reducing the rates after the price had been lowered to 3s. 3d. Mr. French contended that it would be unfair to the large gas consumers to make them pay an extra sum towards the general district rate. After some further remarks, it was decided to refer the matter back to the Committee. A resolution was passed thanking Mr. Gray for his report.

We have received from Messrs. Revy, Phillips, and Co., of No. 181, Queen Victoria Street, E.C., a newly-issued sectional catalogue of their cooking apparatus of every description—for gas, coal, or steam—and accessories, boilers, hot-water cisterns, &c. Many of the appliances are on a large scale, suitable for restaurants and hotels. There are also separate pamphlets dealing with the "Reliance" automatic tubeless counter boiler and with the "Revy" patent silent boiling nozzle, which are claimed to be the most efficient, reliable, and economical caterers' requisites that have yet been offered for sale. The "Reliance" boiler is said to be automatic in every sense; the gas being controlled by a super-sensitive automatic valve, which permits of only a sufficient amount of gas being used to heat the quantity of water to boiling-point, and then closes down. The water-valve allows only a sufficient quantity of water to pass to supply the amount withdrawn. The "Revy" nozzle has been designed to overcome the difficulty of obtaining full efficiency in heating liquids by steam. Among its uses is stated to be that of keeping the water-seals of gasholders from freezing in winter.

MALTA AND MEDITERRANEAN GAS COMPANY.

The Government Electricity Supply.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 59-60, Gracechurch Street, E.C.—Colonel JAMES LE GEYT DANIELL in the chair.

The SECRETARY (Mr. A. W. Cooper) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said, both last year and in 1907, the shareholders had been prepared by remarks from the chair for a reduction in the amount of gas sold, in consequence of the installation of electricity at Malta by the naval establishments (which had always been good customers of the Company), and possibly from the military establishments if the authorities should decide to continue adopting electricity, and purchase it (as they would have to do) from the Government of Malta. Now these events had taken place, or to a certain extent were taking place, because they were still in a state of transition. It was only lately the military authorities had informed the Company that they had decided to extend the system to the various barracks. He for one—probably a good many of the shareholders also—knew how careful the War Office were in the matter of expenditure; and he therefore indulged the hope that, however desirable it might be to use the electric light in the hospitals, it could not be on the score of economy that they proposed to extend it to the barracks, because, as the shareholders were aware, the Company could supply the barracks with gas lighting, under the incandescent system, at about half the price at which the same illumination could be obtained by electricity. It must therefore be from some other cause than that of economy that had brought the authorities to this decision. It would be satisfactory to the shareholders to know that, notwithstanding the great reduction in the supply of gas to the naval establishments, the amount of gas sold during the financial year under review was only £649 short expressed in sterling, and by measurement the sale was 122,459,000 cubic feet, as against 126,518,000 cubic feet the preceding year. Therefore, they had been making up the consumption in other ways. In Malta—for that was their principal station—they were pushing extensions wherever they could see their way to do so with any prospect of profit. Times, the Directors were told by their Manager, had been very bad in Malta. So far as he (the Chairman) could make out, they had been bad everywhere. But their active officers—and they were active ones—on the other side, were doing, each in his own particular sphere and capacity, his very best to compete with the Government electricity. They were pushing out their services, wherever possible. The position of affairs at the two Sicilian stations was certainly no more satisfactory than a year ago. It was responsible for the increase in the amount due by sundry debtors. As the shareholders knew, the Company had secured judgment against the towns in respect of the principal part of the old debt; but the Directors had had to invoke the aid of the Foreign Office, and ask them to request the British Ambassador in Italy (Sir Rennell Rodd) to approach the Ministers with a view to enable money to be raised, or rather to instruct that money be raised, for the payment of the Company. This having been done, he could not, of course, say much to the shareholders on the subject beyond this, that the people on the other side seemed very anxious that the Company should renew the concessions. But, of course, the Directors could not do such a thing until the Company were paid in full, and, further than that, until they had some guarantee of better payment in future. He believed the authorities were anxious to do this; and from what the Board had heard that day from Trapani—it was Trapani he was now referring to—there seemed to be some little activity in trying to raise money for the purpose of paying the Company. If it was necessary—he hoped it would not be—he was perfectly prepared to personally push the matter on the other side. But it was much better left to the Foreign Office if the Directors could manage to push them here, and let them do the pushing the other side. Of course, he must say something on behalf of Trapani and Marsala. Everything had been put out of gear by the terrible earthquake at the end of last year; but he fancied they were recovering from that, and would not be able to use it as an excuse to the Company. To sum up the position, the accounts showed that the profit was £10,939, against £13,481. But in the course of the year, it would be observed, the debenture debt had been reduced by £4000; and the amortizement account had been increased from £32,966 to £35,491. The £10,500 of debentures that they now had were to run at 4 per cent. Going a little in detail into the accounts, coal cost about £53 less, although they had consumed 362 tons more. The reduction must therefore be due to the price at which they had been enabled to buy coal. The cost was 19s. 0⅝d. per ton, against 19s. 5⅝d. the previous year. He might say that they carbonized 10,273 tons, and produced 10,777 cubic feet of gas per ton. This, he thought, would be considered satisfactory. It would be observed that maintenance had increased to £678I, from £5238 in the preceding year. This was easily explained, because the mains and services that had been laid had cost £555 more, extension of mains had cost £607 more, and on telescoping a holder £1316 had been spent. These items represented a great deal more than the difference between the two years. The item of general trade charges was £311 more; and bad debts were £136 more. If London expenses were £427 more, it was perhaps rather pleasant to feel that the law expenses were less by £379. The general revenue account he had already dealt with. As to the general balance-sheet, the stocks of coal were greater; but this was in consequence of having more coal and coke.

Mr. STEPHENSON R. CLARKE seconded the motion; and it was unanimously carried.

The CHAIRMAN next proposed that dividends at the rate of 7 per cent. on the first preference shares, of 7½ per cent. on the second preference shares, and of 6 per cent. on the ordinary shares, be declared for the year ending March 31, deducting the payments made on account.

Mr. A. M. PADDON seconded the proposition; and it was adopted.

Moved by Mr. S. R. CLARKE, and seconded by Mr. JOSEPH CASH, the retiring Director (Colonel Daniell) was re-elected; and subsequently, on the proposal of Mr. F. R. SMITH, seconded by Mr. E. L. BURTON, the Auditors (Mr. R. Hesketh Jones and Mr. Thomas Guyatt) were re-appointed.

Mr. PADDON, in moving a vote of thanks to the officers, remarked that their duties at the Company's stations were more difficult than those of officials of normal gas undertakings in this country. It was altogether a different thing competing with company or municipal electricity to competing with Government supplied electricity. In this country municipal suppliers of electricity were under the control, or were supposed to be, of the Local Government Board; but when they came to the Government, they were, in the discharge of their duties, practically under the control of no one. When they started this electricity enterprise, so far from trusting it to rest on its own bottom, they absolutely inserted clauses in the leases of their property to compel people to put it in. Their officers had to compete with this sort of thing; and the criterion of how successfully they did it, was the amount of the business with the private consumers. There was this consolation about the position, that the private consumers paid more than the Government departments. If the Company were to have an increase in the consumption of gas, let it be on the private consumption; and if a decrease, then let it be on the lower-priced gas. The accounts reflected the patience and the assiduity of their officials; and to the mature guidance of Mr. Cooper, they owed much of their capacity for extricating themselves from trouble.

Mr. A. F. PHILLIPS seconded the motion; and it was heartily passed.

Mr. COOPER, in acknowledgment, said he was very gratified with this vote of confidence, and he was sure the officers abroad would share in his feelings.

Mr. JOSEPH CASH, in moving a vote of thanks to the Chairman and Directors, said he must say that the way the affairs of the Company had been managed the last few years had been very satisfactory indeed, considering the difficulties the Board had had to contend with, especially in regard to the electric light. If people would go to other quarters for what they required, the Company could not help that. But it could be easily shown that gas was an infinitely cheaper commodity than electricity, and he also said better, though he was a gas man. The use of gas in barracks and hospitals had the effect of producing a better sanitary condition than the electric light could ever do. It had the effect of causing a certain amount of heat; and, given proper ventilation, a purer atmosphere for the men and the invalids was maintained. This fact might be impressed upon the Government officials. In conclusion, he congratulated the Board on the accounts presented.

Mr. T. WILKINS seconded the motion; and it was cordially agreed to.

The CHAIRMAN, in responding, said he quite agreed with Mr. Cash in his remarks as to electricity. The people, however, who had to decide upon matters of this kind were Royal Engineers; and if someone now invented another light they would take it up, so long as it was the newest thing.

This concluded the proceedings.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We have this week obtained particulars of the claim made by Mr. W. Ewing against the Corporation of Greenock in respect of engineering services rendered by him in connection with the Corporation gas-works during the eight years he was Manager there (see p. 655). The sum —£1645—is not a large one, and but for the friction which is mentioned in the record as existing between the parties, the litigation need not have been looked upon as serious. Proof has been ordered, and the leading of it will give opportunity for clearing up some matters in connection with gas affairs at Greenock which have not hitherto been made common property—most probably rightly so, because everyone is entitled, to paraphrase Burns, to keep something to themselves which they will tell to nobody. There have been two actions of a similar nature in recent years, in which claims have been made on behalf of Corporation officials for services rendered over a series of years outwith, or said to be outwith, the scope of their employment—one against the Corporation of Edinburgh, and the other against the Corporation of Dundee; and in both instances the Courts have decided against the claims. Mr. Ewing's claim is stronger than either of the other two, in that the period embraced in it is much shorter, and also in that the special work involved was not completed—the latter of which Mr. Ewing makes a point of. As the summer session is within six weeks of its close, it is highly probable that the proof will not be heard till October.

I omitted last week to refer to an item of business which was before the Edinburgh and Leith Gas Commissioners on the previous Monday, which consisted of a report by the Finance and Law Committee to the effect that, a copy of the report by Mr. G. Lisle, C.A., upon the superannuation scheme of the Commissioners having been sent to the Secretary for Scotland, he had replied that he had no view to express as to the security deed for the sum required to be found by the Commissioners to make the fund solvent; and that Mr. Kenward Shiells, C.A., the Government Auditor, having been consulted on the matter, he had expressed the opinion that a document in security of an annual payment of £2035 would be sufficient. Such a deed had accordingly been prepared; and, having been approved by the Committee, it had been signed and sealed on behalf of the Commissioners. Mr. Lisle in his report (see *ante*, p. 322) recommended an immediate contribution by the Commissioners of £67,830.

On Monday last, Treasurer Soutar presented the gas accounts of the Corporation of Dundee to a Joint Committee meeting, and made a statement in the course of which he said that the financial position of the Gas Department was now most satisfactory. The capital account, compared with the annual make of gas, was £433 per million cubic feet; being the lowest on record. When the works were purchased, in 1869, the capital was £1278 per million—a difference of £845. It might not be out of place to point out that the present actuarial value of the undertaking, based on the profits earned, would not be less than £750,000—the capital value in the event of a transfer from a company to the corporation. In fact, £1000 per million cubic feet was considered a low estimate. The present capital was £378,717, less a balance in the bank of £12,362—being £366,355 net at the close of the

year. The make of gas had increased by 49½ million cubic feet. The sales of gas during the year realized £91,127, or £2686 less than the previous year, due to the reduction of 2d. per 1000 cubic feet on the rate, which was equal to £6635 on the quantity of gas consumed. The net income was £3211 down. The total expenditure was £2933 less than in the previous year. The charge for sinking fund was £11,170; and the fund was now on a sound financial basis, which ought to maintain the stability of the department. Annuities, interest, and sinking fund charges were 6·95d. per 1000 cubic feet, against 7·35d. in the previous year. The anticipated net income for the current year, with the gas reduced by 1d. per 1000 cubic feet, was £122,326—a reduction of £3846. A differential charge was proposed for gas for industrial purposes, and also a sliding-scale for that used in gas-engines. In anticipating the expenditure required for the year, it was found that a saving would be effected in carbonizing charges. On the net cost incident to the manufacture of gas, the charge would be £3773 less, which was more than was required to meet the lessened income. It was some four years since cooking stoves and appliances were given on loan with free fixing, and the result had verified the anticipations then formed of the benefits to the consumers. The time had come when the Corporation could still further confer benefits upon consumers. As it would not be advisable meantime to give gas-fires on the same lines as cooking appliances, it was proposed to hire them at a fixed rental of 10 per cent. on the cost. The accounts and estimates were approved; and on the motion of Lord Provost Urquhart, Conveners and officials were specially thanked for their services.

The policy proposed by the Corporation of supplying gas-fires was submitted to criticism in the Dundee Trades' Council on Wednesday evening. A resolution in favour of the proposal was submitted. One of the members pointed out that plumbers did most of the gas-fitting work in Dundee, and were paid 9d. per hour; whereas the Corporation allowed their employees on this work only 7d. per hour. By the proposal, therefore, they would be cutting the feet from the employers, and taking away the earnings of the plumbers and gas-fitters. The same member also pointed out that there was a great wastage of gas-pipes in the city, in respect that, when a stove or heater was removed, the piping which had been introduced was left. An amendment was submitted; but the Council approved of the action of the Town Council by 28 votes to 6.

Extensions are in progress at the Arbroath Corporation gas-works, which are very efficiently managed by Mr. A. C. Young. Part of the scheme is the erection of new condensing plant, the work of which is now completed. A new gasholder, of 400,000 cubic feet capacity, is in course of erection, which will bring the total storage capacity of the works up to 700,000 cubic feet—nearly equal to one-and-a-half times the maximum daily output. The cost of both the condensers and the holder will be about £6000. The connections with both have been made by the Corporation employees, by which means a saving of about £250 has been effected in comparison with the lowest tenders received for the work. The Manager's report for the past year was submitted to the Gas Committee on Monday. He stated that the quantity of gas made was 97,665,700 cubic feet—an increase over the previous year of 1,778,880 feet. The gas made per ton of coal was 9852 cubic feet—an increase of 57 feet. The gas sold amounted to 90,881,637 cubic feet—an increase of 2,316,907 feet. Gas unaccounted for—5,153,364 cubic feet—was equal to 5·27 per cent. of the quantity made. The gas sold through ordinary meters showed a decrease of 2,448,993 cubic feet; but coin-meters showed an increase of 4,618,400 cubic feet, and gas-engines an increase of 147,500 cubic feet. The total amount collected for gas was £13,786—a decrease of £486, due to a reduction of 2½d. in the price last year. The number of prepayment meters in use at May 15 was 2880—an increase of 319. The number of stoves, grills, and rings belonging to the Corporation in use was 4003—an increase of 794. There were, in addition, 36 radiators hired to consumers; and 31 gas-fires were sold during the year. Cookers are depreciated by 10 per cent. yearly; and the present value of such plant is £4516. The output of sulphate of ammonia had increased from 21·4 lbs. per ton of coal used in 1901 to 29·9 lbs. in 1908-9; the total quantity sold last year having been 134 tons, compared with 69 tons in 1901. During the past seven years there had been put down and paid for out of suspense account: New retort-bench, £1049; new scrubbers, £2018; new boiler and pump, £563; additional new retort-bench, £1251; twelve new waggons, station meter, &c., £2411; new 12-inch mains, £232; and coal-testing plant and new governor, £412. There had been put down and paid for out of revenue: Part of new retort-bench, £1221; new retort-house, £964; new sulphate plant, £359; and new mains, £1242—a total from both accounts of £11,728. After meeting all liabilities, there is a balance of £2000 at credit; and the Gas Committee have felt justified in recommending that the price of gas be reduced by 2½d., making it 2s. 8½d. per 1000 cubic feet.

I have before now commented upon the lenient view which Sheriff Campbell Smith, of Dundee, takes of the crime of theft from prepayment meters. Another example of his Lordship's leniency is afforded by a case which came before him on Wednesday. Two youths were charged with having, in about twenty cases, broken into houses and committed thefts, chiefly from prepayment meters, to the amount of £2 13s. 10d. The accused started on May 12 to go through the houses of poor people who were out working, and by the 17th they had committed these offences. Sheriff Campbell Smith fined them £2 each, with the alternative of twenty days in gaol; and they would have to find caution to the extent of other three guineas, or go to gaol for thirty days more.

In the Kirkcudbright Town Council last week, the Gas Manager—Mr. J. Gibson—reported that the income for the year had been: From gas, £1218; and from residuals, £231—together, £1449. The expenditure amounted to £1199; leaving a surplus of £250. The Gas Committee recommended an increase of £10 a year to the Manager's salary. This was eventually granted by eleven votes to four.

On a recent evening, a fault on a feeder caused a complete failure of the electricity supply in the whole of the Seafield district of Broughty Ferry.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June 5*.

Sulphate of Ammonia.

The market has been quiet, partly owing to the intervention of holidays no doubt, and there has been no special feature upon which to comment. Prices are the turn in favour of buyers, though available supplies have not been abundant. The closing quotations are £11 per ton f.o.b. Hull, £11 2s. 6d. per ton f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. For delivery over the near months, the equivalent of spot prices are being quoted speculatively abroad, and business is reported to have been done. For delivery further ahead, the divergence between makers' and buyers' ideas remains too great to admit of much first-hand business.

Nitrate of Soda.

This market has also been quiet, and spot prices have been reduced to 10s. 4½d. per cwt. for 95 per cent., and 10s. 7½d. for refined quality.

LONDON, *June 7*.

Tar Products.

The market for pitch has been very firm indeed throughout the past week; and although prices have not actually advanced, there is decidedly more disposition to pay them. Creosote is steady, but business is rather quiet just at present. It is a good sign, however, that in the railway contracts which have been let lately, the Companies have exercised their option to take the maximum quantity asked for. Benzol is as quiet as ever; and sales have taken place in the North at 5¼d. to the end of August. Crude benzol and coke-oven crude naphtha are fetching very poor prices. Solvent is steady without very much business; while 60's carbolic are quiet. The late spurt seems to have died away. Tar is very firm, and decidedly difficult to secure for near delivery. Owing to a clerical error, the lowest price for tar in last week's issue was given as 11s. 6d. This, of course, should have been 14s. 6d.

The average values during the week were: Tar, 14s. 6d. to 18s. 6d., *ex* works. Pitch, London, 27s. 6d. to 28s.; east coast, 27s. to 27s. 6d.; west coast, 26s. to 27s. f.a.s. Mersey ports, 26s. 3d. to 27s. 3d. f.o.b. others. Benzol, 90 per cent., casks included, London, 5¾d. to 6d.; North, 5¼d. to 5½d.; 50-90 per cent., casks included, London, 6¾d.; North, 6d. to 6¼d. Toluol, casks included, London, 8d. to 8¼d.; North, 7½d. to 7¾d. Crude naphtha, in bulk, London, 3½d. to 3¾d.; North, 3d. to 3¼d.; solvent naphtha, casks included, London, 11d. to 11¼d.; North, 9d. to 10d.; heavy naphtha, casks included, London, 10¾d. to 11¼d.; North, 9¾d. to 10¼d. Creosote, in bulk, London, 2⅞d. to 2 13/16d.; North, 2¼d. to 2⅝d. Heavy oils, in bulk, 2⅞d. to 2 15/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 2d.; west coast, 1s. 1d. Naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

There is very little change reported in sulphate of ammonia, though the market has been steady. Beckton prompt is quoted at £11 10s.; and ordinary makes on Beckton terms at £11 to £11 1s. 3d. In Hull, the price is £11 to £11 1s. 3d.; and in Liverpool, £11 2s. 6d. In Leith, £11 5s. is quoted.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a good demand for coal for prompt shipment, and the export is full; but there are few forward sales, owing to the uncertainty of the early future. In the steam coal trade, best Northumbrian kinds are quoted from about 12s. 9d. to 12s. 10d. per ton f.o.b. Second-class steams are 10s. to 10s. 9d. per ton, and steam smalls from about 5s. 6d. to 6s. 6d.—the latter being firm and in strong request. The output at the collieries is maintained, and is also well taken up. In the gas coal trade, there is a strong demand for this season, though the shipments to the southern gas companies are low, as usual near the middle of the year. Durham gas coals vary in price from about 9s. 3d. to 10s. 10½d. per ton f.o.b. for the usual classes, according to quality; while for "Wear specials," up to 11s. 3d. is quoted. There is a heavy export, both to the Baltic and to some of the ports of southern Europe, chiefly on contracts that were entered on some time ago. For forward delivery prices are firm, and there is not much disposition to enter into business. It is, however, understood that the sales to Italy include about 10,000 tons for delivery over the rest of this year, at a price equal to 11s. 3d. per ton f.o.b. for special kinds. Coke is firmer; and gas coke, being in moderate output, is steady at about 13s. per ton f.o.b. in the River Tyne.

Scotch Coal Trade.

The market does not seem to be much affected by the situation brought about by the failure to come to an agreement over the wages question. The foreign request remains unsatisfactory, and the demand for home consumption is accelerated by the desire to cover the chance of a strike. But that the prospect of a strike is considered remote is reflected in the quotations, which are almost the same as a week ago. These are: Ell 8s. 9d. to 10s. 9d., splint 9s. 6d. to 10s., and steam 9s. to 9s. 3d. The shipments for the week amounted to 315,264 tons—a decrease of 1017 tons upon the preceding week, but an increase of 14,236 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,676,631 tons—an increase of 308,261 tons upon the corresponding period.

The Clacton Urban District Council have rejected a recommendation by a Special Committee, appointed to inquire into the working of the gas and water undertakings, that the services of the Gas and Water Consulting Engineer be not retained, and that Mr. F. Robinson be retained as Manager, at an increased salary.

The New Gas-Works at Coventry.

The new gas-works which have been erected by the Coventry Corporation at Foleshill, to meet the needs of a rapidly extending city, are to be officially opened on Thursday. The Mayor (Alderman William Lee) will perform the ceremony, and afterwards entertain a large company at dinner in St. Mary's Hall. The new works are about a mile-and-a-half from Coventry, and occupy 40 acres, 7 acres of which are separated from the main portion by the Nuneaton Railway. A locomotive owned by the Corporation brings the coal into the sidings, and hydraulic power is used in tipping the waggons. The coal-stores have a capacity of 4000 tons, and the overhead hoppers in the retort-houses hold sufficient coal for 48 hours' supply. The total capacity of the works is 4½ million cubic feet of gas per day, to which can be added, in case of necessity, 1¼ million cubic feet of water gas. The two holders have a capacity of 1¾ million cubic feet each, and are connected with those at the Coventry works by a 24-inch main. The chemical works are capable of producing daily 5 tons of sulphate of ammonia, or, if desired, the same quantity of sulphuric acid. In addition, there is plant for producing concentrated ammonia. The electrical plant consists of two 75 H.P. gas-engines, coupled direct to two 45-kilowatt generators. The hydraulic plant gives a pressure of 750 lbs. for turning the capstans and tipping the trucks. It is calculated that 200 men will be employed when the works are in full operation; and every provision has been made for their comfort and convenience.

Morley Gas Undertaking.—The Manager of the Morley Gas-Works (Mr. H. J. Hemingway) has presented his report to the Corporation, showing that for the year ending March 31 the profit was considerably less than in the previous year, due largely to two causes—the smaller consumption of gas and the increased cost of coal. The net profit was £89, which was £817 less than that of the previous year, There were 3577 prepayment meters in use; and the weight of copper removed from them during the twelve months was 9 tons. The total revenue was £19,505, compared with £20,420; and the expenditure was £12,126, compared with £12,253.

New Joint-Stock Companies.—The Kirbymoorside Lighting Company, Limited, has been registered with a capital of £5000, in £1 shares, to take over the business of the Kirbymoorside Gas and Water Company, Limited, as well as certain land at Kirbymills, and to adopt agreements with the Company, the Liquidator (Mr. C. Whittell), and others. Among the subscribers is Mr. H. Tobey, of Malton, who is also one of the first Directors. The East Coast Water Company, Limited, has been registered with a capital of £10,000, in £5 shares, to adopt an agreement with the North-East Lincolnshire Water Company. The Metropolitan Incandescent Company, Limited, with a capital of £1000, in £1 shares, has been formed to acquire the business carried on by A. Cross, at No. 21, Atlantic Road, Brixton, S.W., and to trade in incandescent-mantles and gas-fittings and as makers and agents, &c.

New Water Supply for Exmouth.

An analysis of the new water supply from the Dotton borehole at Exmouth gives the most satisfactory result. Mr. Tickle, the County Analyst for Devon, to whom the sample was submitted, describes the water as remarkable for its freedom from all qualities which characterize drainage from the surface land or soil. Its organic purity is thus unsurpassed; and from the nature of the circumstances, its excellent quality is permanently assured. In regard to mineral constituents, the water is hardly less remarkable. Nothing is included of a prejudicial nature; and the water is of a moderate degree of hardness. The report was read at a meeting of the District Council on Wednesday, and the Medical Officer of Health (Mr. O. Eaton), corroborating the opinion of the County Analyst, expressed the view that the quality of the water was unique. A long discussion ensued as to the scheme. Mr. Randell moved that the operations at Dotton be suspended, and the scheme abandoned. He contended that the undertaking would be very costly, and that the pumping might interfere with the sources of the present water supply. The Rev. O. J. Reichel, who seconded the resolution, said that, according to the Bill which was to have been promoted this session, the cost of the scheme was estimated at £43,000; but including the interest on the loans it would amount to £90,000. There would be an annual charge of £1000 for upkeep; and the total charge on the rates would not be less than £4000 a year. Mr. Crews said it would be absolutely wicked to abandon the scheme, seeing that the trial boring had proved a magnificent success, for they had tapped an unlimited supply of the purest water. As to the cost, he did not think that it need exceed £25,000, against £100,000 required for an impounding reservoir. Mr. Beavis, who was the Manager of the undertaking when it was owned by the Water Company, considered that the Dotton scheme would be very expensive; and he supported the proposal for putting an end to the operations at this spot. The resolution was rejected by a majority of 12 to 6.

Warrington Gas and Water Works Results.—The Secretary of the Warrington Corporation Gas-Works has presented a balance-sheet for the year ended March 31 last, showing a net profit of £13,387, which will be carried to the credit of the improvement rate. The Borough Treasurer reports that for the same period there was a gross profit on the water undertaking of £19,596; and after paying out of this the sinking fund and interest charges, amounting to £18,500, there remains a net profit on the year's working of £1091, against a loss of £1047 for the previous year. The net profit has been kept in hand to increase the working balance, which has been considerably reduced during the past five years. The capital account is overdrawn by £19,250; and the loans outstanding amount to £384,548. The sinking fund has £1065 in hand; the accumulated profits forming the working balance in the revenue account amount to £4034; and the reserve fund has £3853 standing to its credit.

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Fresh Outlet

for Gas Consumption a medium of great value.

These Ovens can be supplied in Batteries of Two or more as desired.

JOHN WRIGHT & CO.,

Essex Works,

BIRMINGHAM.

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The First Year's Working at Wolstanton.

A report on the first year's working of the gas undertaking of the new Urban District Council of Wolstanton has just been published. The quantity of gas sold to ordinary and prepayment consumers was about 50 million cubic feet; and the amount consumed for the public lighting brought the total up to 59 millions. The make of gas per ton of coal carbonized was 11,775 cubic feet. Additional consumers during the year numbered 196, and there were 218 new customers for cookers, The number of consumers by ordinary meters is now 1327, and by prepayment meters 2067; making a total of 3394. The number of cookers and grillers on hire at the close of the year was 1059. With regard to finances, the Council received £9158 for gas, meter and stove rents, and public lighting, and £1799 from the sale of residuals; making a total revenue of £10,957. The total expenditure was £5952, leaving a gross profit of £5005. Up to March 31, 1908, the total loans amounted to £48,446. During the past year, there was paid off an outstanding balance on the building of the gas-works, interest and repayments of loans had been met, and there was a net profit of £1146. A sum of £3269 had been repaid on capital account.

Gas Tragedy at Leeds.—Charles Wilson, whose age was about 25, and whose father was for a time Labour representative in the Leeds City Council, was left alone in the house on Whit Monday; and his younger brother, on returning home in the evening, noticed a strong smell of gas. On entering, he found his brother Charles lying dead. In his mouth was one end of a piece of rubber tubing, the other end of which was attached to a gas-burner.

Gas Profits at Birkenhead.—The Deputy-Chairman of the Gas Committee (Mr. Halsall) informed the Birkenhead Corporation, at their monthly meeting, that there was a divisible profit on the undertaking of £22,000; and during the year £164 had been spent to provide work for the unemployed. A sum of £1000 had been put to the renewals fund; and the amount standing to the credit of the fund was £29,178, equal to 6¾ per cent. on the capital outlay. There was also a further £13,000 as a special reserve fund; and the amount the Committee were able to hand over to the relief of the rates was £10,000.

New Issues of Gas and Water Stocks and Shares.—As announced in our advertisement columns, at the Mart, Tokenhouse Yard, E.C., to-morrow, Messrs. A. & W. Richards, will offer for sale, by order of Directors, 750 new ordinary £10 shares (5 per cent. maximum) in the Southend Water Company, and £1000 of 4 per cent. perpetual debenture stock and £8000 of new ordinary stock of the Great Yarmouth Water Company. The Reading Gas Company are inviting applications for £5000 of 4 per cent. perpetual debenture stock, at a minimum price of £102 per £100, tenders for which are to be sent in by Monday next. Messrs. Geo. Nichols, Howes, Young, Alder, and Co., will offer for sale at Bristol, on the 17th inst., £25,000 of general capital stock and £10,000 of new debenture stock of the Bristol Gas Company.

Gas Workers' Wages at Blackpool.

At their meeting last Tuesday, the Blackpool Town Council had before them the question of the wages paid to the labourers in the employ of the Gas Department. The Gas Workers' Union recently wrote asking that the wages be increased 6d. per day; but the Committee refused the application. When this decision came up for confirmation, Mr. Laycock proposed, as an amendment, that the increase be granted. He said the cost of living in Blackpool was higher than in most other towns, and that the 22s. per week earned by the gas labourers was not sufficient to maintain a family properly. The average profit from the Gas Department that went towards the reduction of the rates was £15,000; while the actual wages bill of the men who earned this profit was £12,000. He suggested that the Gas Manager's salary be reduced from £600 to £400, and remarked that the difference of £200 would pay the required increase in the men's wages, without any addition to the annual expenditure of the department. A few members expressed themselves as being in favour of the advance, but not by reducing the Manager's salary; and the Mayor, in opposing the amendment, said the wages paid at Blackpool were fair and on an average with other towns, according to the list of wages presented to the Committee. The Blackpool men were better off as regarded holidays than those in other towns. The amendment was defeated by a large majority.

Satisfaction at Neath.—In his annual report to the Neath Town Council, Mr. R. A. Browning, the Gas Engineer and Manager, showed that the profits from the Council's undertaking enabled the Committee to again recommend the transfer of £1000 in relief of the rates, and to carry forward £5000 odd to the current year's accounts. Alderman Morgan, in moving the adoption of the report, remarked that the Committee were very satisfied with the condition of the works; while the profits of the undertaking not only provided for the repayment of loans and interest, but enabled the Council to transfer a large sum in reduction of the rates. A further cause for congratulation was the increase of gas consumption.

Liquidation of Moffat's Limited.—The shareholders in this concern having decided upon voluntary liquidation, the Liquidator (Mr. R. H. Lerney) called a meeting of creditors, which was held last Tuesday at the Company's offices. It was reported that the liabilities to unsecured creditors amounted to £8480, while the assets totalled £26,702. The preferential claims amounted to £134, and after providing for these, and for debentures of £7597, the net assets were reduced to £19,050. Included among them was a sum of £13,000 for goodwill and patents. The Liquidator stated that he was endeavouring to arrange for the business to be carried on with a view to its sale as a going concern; and it was decided to adjourn the meeting for a month in order to enable the Directors to place a scheme before the creditors.

APPRECIATIONS.

SERIES No. 3.

Gas Engineers have written:—

"A nice and suitable Booklet. Please send on a supply at earliest possible moment."

"Thanks for advance Copy. Please forward an early supply."

"Herewith Particulars showing rates of Cookers on Hire. Booklets will oblige."

May we forward a Supply of Booklets for distribution to your Consumers?

THE RICHMOND GAS STOVE & METER CO., LTD.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. *General Offices and Works: Warrington.*

Cleethorpes Gas Company's Assessment.—The assessment of the works of the Cleethorpes Gas Company was recently placed by the Assessment Committee at £3595. The Company had retained Messrs. W. A. Valon and Son; and on Friday, the 28th ult., Mr. Arthur Valon appeared before the Assessment Committee, with the result that the £3595 has been reduced to £2600.

Sales of Shares.—Ten £10 shares in the Dorking Water Company, which were offered for sale at the Oddfellows' Hall, Dorking, last week, by Messrs. Arnold and Son, realized £177. Some new £10 shares in the Burgess Hill Water Company, recently submitted to public competition by a local firm of auctioneers, Messrs. Drawbridge and Ansell, fetched from £15 to £15 10s. each.

A Smaller Profit at Carlisle.—The statement of accounts which the Treasurer has laid before the Carlisle Corporation Gas Committee shows the gross profit on the gas-works revenue account for the year to March 31 to have been £5909, as against £9290 for the previous year. After deducting loan charges, interest, &c., the net profit to be transferred to the city fund is £287, as compared with £3634 for the twelve months before. The net profit for the year 1906-7 amounted to nearly £7000.

Ownership of Money in Prepayment Meters.—At the Tower Bridge Police Court last Friday, before Mr. Rose, a question in regard to the ownership of money deposited in prepayment meters was raised on a charge brought against Alfred Higsmore, a plumber, of Avondale Square, Old Kent Road, of stealing 2s. from a meter of this kind belonging to the South Metropolitan Gas Company. Mr. Washington, who appeared for the Company, admitted that previous deficiencies had been forgiven, because the Company, in whose employment prisoner was, were unwilling to make him a felon. Accused was the consumer of the gas which had passed through the meter in question; and it appeared that he had taken coins from the money-box, and had used tin discs to obtain a supply. When, however, the collector called, he paid the amounts which were registered as due until the last occasion, when his offer to pay was refused. He now contended that he was within his right in using the money till the time of settlement arrived on the call of the collector. Mr. Rose observed that it was a question for a Jury whether or not prisoner's intent was felonious. Mr. Washington pointed out that, according to law, all moneys dropped into the meter became at once the property of the Company, and were removable only by their agents. Evidence having been given, the case was adjourned.

Mr. F. J. Gould, who recently resigned his position as London Manager for Messrs. James Milne and Son, Limited, has been appointed Manager to the Bland Light Syndicate, Limited, of London and Manchester.

The Corporation of Ghent have decided to duplicate their Kramers and Aarts water-gas plant with another section of a capacity of 500,000 cubic feet per diem, as they have been so satisfied with the first set which has only been working three months.

The fusing of an underground electric cable was responsible for the appearance of flames which shot up from the pavement in New Bridge Street, Newcastle-on-Tyne, last Saturday week. The brigade were sent for; and in due course the fire was overcome by the application of sand.

At the last meeting of the Gas Committee of the Leipzig Corporation, it was decided to carry out an installation of coke-quenching plant for the chamber furnaces of the No. 2 gas-works in Leipzig-Connewitz, in the form of a travelling quenching tower with transport appliances and intermediate bunkers. The contract has been entrusted to Messrs. Adolf Bleichert and Co., of Leipzig and London.

A recent number of the "Manchester Courier" contained the following appreciative remarks in regard to "Coalexld": "Manchester has heard a lot in recent years of smokeless coals—has, indeed, heard more than it has seen of certain kinds. One of these coals, however—'Coalexld'—seems to be selling very well here, judging from the reports of agents in the district. It is contended that 'Coalexld' can be burnt in Salamander stoves in which anthracite has hitherto been the only combustible material. Freedom from arsenic is one of the good features of the new comer, which, by the way, won a diploma of merit at the Smoke Abatement Exhibition in Sheffield last March."

The "Sunday Times" is responsible for a statement that the prices of thorium nitrate have recently declined 20 per cent., and fears are entertained of a further fall. Our contemporary continues: "The manufacture of thorium nitrate was hitherto either in German hands or in those of the Vienna Welsbach Company, which belongs to the English Welsbach concern. The monazite sand was supplied by John Gordon, of Rio de Janeiro, and by Messrs. A. C. De Freitas, of Hamburg. The latter firm had entered into a contract with the Brazilian Government by which it undertook to work the monazite deposits and to export 1200 tons per annum. The yearly consumption of monazite is about 2100 tons, of which the United States supply 300 tons and Brazil 1800 tons. Of the latter quantity, De Freitas supplied 900 tons; but in addition the firm exported a further 2000 tons a year in order to accumulate a large stock in Hamburg. Gordon, too, exported more than his requirements. In this manner, a stock of about 12,000 tons has been accumulated in Europe. Last February, the chief partner of Messrs. De Freitas died; and his heirs began to sell to outsiders. Seven years' consumption has been supplied ahead; and thorium nitrate is offered on all sides. The Thorium Convention, which exists practically only in name, has lowered the price from 32 M. to 25 M. per kilo.; while outsiders are selling at 23 M. The prospects for the thorium manufacturers are therefore the reverse of promising, at least for the next five years. The total production of gas mantles is given as follows in the 'Plumber and Journal of Heating': Germany, 100 millions; United States, 55 millions; Great Britain and Colonies, 35 millions; France, 15 millions; Austria, 3 millions; and divers 5 millions—together 213 millions. This would require 230,000 kilos. of thorium nitrate. Since 40,000 kilos. are won from the ashes of old mantles, the new requirements total 190,000 kilos. of thorium nitrate, or 1800 tons of monazite sand."

MEETING
OF THE
INSTITUTION
OF
GAS ENGINEERS
LONDON.
June 15 to 18, 1909.

When in London make a point of seeing the New Show-Rooms of

THE PARKINSON STOVE CO., LTD.
(Incorporating Maughan's Patent Geyser Co.),

at 129, High Holborn, W.C. (close to Kingsway and adjoining the British Museum Tube Station).

They are full of interest and replete with

MODERN GAS-HEATING APPARATUS

embodying the latest models in

GAS COOKERS,
RADIATORS, FIRES,
MAUGHAN'S GEYSERS,

and other

WATER HEATING
APPLIANCES.

THE
PARKINSON STOVE Co., Ld.
(Incorporating
Maughan's Patent Geyser Co.)

BIRMINGHAM:
STOUR STREET,
SPRING HILL.

LONDON:
Office and Show-Room:
129, HIGH HOLBORN,
W.C.

We learn from the Liquidator of the Khoma Gas Arc Lamp, Limited, that arrangements have been made to organize a new Company with a capital of £10,000, of which £5000 has been underwritten. The reason assigned for the formation of the new Company is the need of more capital for the purposes of the business. The winding-up of the old Company is voluntary, to enable the new one to take over the business.

The Imperial Stove Company, of Leamington, have again been successful in securing from the South Metropolitan Gas Company their contract for packed cookers. The firm obtained the two former contracts for 2000 cookers; and the Company have now placed with them a further contract to supply them with the whole of these cookers during the next three years. It will take no less than 150 large railway waggons to despatch this order. To avoid inconvenience to the Company, and loss to themselves, the firm made special fittings for a number of waggons so as to prevent rocking during shunting operations. This has proved very successful; and the breakage in transit is practically *nil*.

The Gas Committee of the West Bromwich Corporation propose to have the water-gas plant, which was installed in 1901, completely overhauled without delay, and to carry out such alterations and additions as may be found necessary. They have under consideration an exhaustive report on the subject by the Gas Engineer (Mr. Harold E. Copp); and while they have not decided on any of the schemes set before them, they believe the work may be executed for a sum of £1500 or £2000, which will be paid out of revenue.

The minutes of the Bradford Gas Committee contain the following resolution: "That for the present no canvassing shall be done by either the Gas or the Electricity Department, one department against another, in any district where there are now gas mains or electricity cables; but that where applications are received for a supply of either electricity or gas, the department shall be at liberty to canvass for customers on giving notice of such intention to the other department. Both the above clauses not to affect canvassing for power purposes where the other department is not affected."

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHEMIST. No. 5103.
WORKS CHEMIST. Preston Gas Company. Applications by June 14.
DRAUGHTSMAN. No. 5103.
DRAUGHTSMEN. W. J. Jenkins and Co., Retford.
CLERK (GAS-WORKS). Schultz, Comins, and Co., Cannon Street, E.C.
IMPROVER TO GAS-FITTING. Dorking Gas-Works.

Situation Wanted.

SECRETARY, MANAGER, OR ACCOUNTANT. W. B. Mimmack, St. Paul's Cray.

Correspondence Classes.

CORRESPONDENCE COLLEGE COMPANY. Department B., Cambridge.

Process for Disposal.

SELF-IGNITING MANTLE. 57, Holtwhites Hill, Enfield.

Plant, &c. (Second-Hand), for Sale.

ASCENSION PIPES, &c., CONDENSERS, PURIFIERS, GOVERNOR, ENGINE AND EXHAUSTERS, WEIGHBRIDGE, &c. Draycott Gas Company.
GAS-COOKERS. Coventry Gas Department.
PURIFIERS, &c. Sutton Gas Company.

Plant, &c. (Second-Hand), Wanted.

LIVESEY WASHER. No. 5098.

Meeting.

INSTITUTION OF GAS ENGINEERS. Institution of Mechanical Engineers, Storey's Gate, S.W. June 15, 16, and 17.

Stocks and Shares.

DRAKES LIMITED. June 18.
PORTSMOUTH WATER COMPANY. June 15.
RAINFORD GAS COMPANY (PROSPECTUS). June 16.
READING GAS COMPANY. June 14.
SOUTHEND WATER COMPANY. June 9.
YARMOUTH WATER COMPANY. June 9.

TENDERS FOR

Brass Fittings.

DARWEN GAS DEPARTMENT. Tenders by June 26.

Coal and Cannel.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 16.
BANGOR (CO. DOWN) GAS DEPARTMENT. Tenders by June 21.
BEVERLEY GAS DEPARTMENT. Tenders by June 24.
BURY CORPORATION. Tenders by June 14.
EVESHAM GAS DEPARTMENT. Tenders by June 26.
HINDLEY GAS DEPARTMENT. Tenders by June 14.
NEWBURY GAS DEPARTMENT. Tenders by June 11.
NEWCASTLE-UNDER-LYME GAS DEPARTMENT. Tenders by June 14.
NORTHWICH GAS COMPANY. Tenders by June 10.
ROTHERHAM GAS DEPARTMENT. Tenders by June 22.
SALISBURY GAS COMPANY. Tenders by June 12.
SKIPTON URBAN DISTRICT COUNCIL. Tenders by June 14.
SPALDING GAS DEPARTMENT. Tenders by June 17.

Lighting.

WHITEHAVEN HARBOUR COMMISSIONERS. Tenders July 20.

Lime.

HINDLEY GAS DEPARTMENT. Tenders by June 14.
KEIGHLEY GAS DEPARTMENT. Tenders by June 14.

Oxide of Iron.

DUNDEE GAS DEPARTMENT. Tenders by June 12.

Pipes, &c.

DARWEN GAS DEPARTMENT. Tenders by June 26.
KEIGHLEY GAS DEPARTMENT. Tenders by June 14.

Sulphuric Acid.

KEIGHLEY GAS DEPARTMENT. Tenders by June 14.

Tar and Liquor.

BRIERLEY HILL GAS COMPANY. Tenders by June 26.
DARWEN GAS DEPARTMENT. Tenders by June 26.
HEREFORD GAS DEPARTMENT. Tenders by June 21.
NEWCASTLE-UNDER-LYME GAS DEPARTMENT. Tenders by June 14.
OLDHAM GAS DEPARTMENT. Tenders by June 22.
READING GAS COMPANY. Tenders by June 21.
ROTHERHAM CORPORATION. Tenders by June 22.
SKIPTON URBAN DISTRICT COUNCIL. Tenders by June 14.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 670.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17½–18	..	5 11 1
298,955	10	,,	7	Do. 7 p.c.	12½–13	..	5 7 8
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	May 27	6⅓	Bombay, Ltd.	5⅜–5⅝*	..	5 12 7
40,000	5	,,	6⅓	Do. New, £4 paid	4¼–4⅜*	..	5 18 10
50,000	10	Feb. 25	14	Bourne-mouth Gas and Water Pref. 6 p.c.	28⅜–29½	..	4 15 9
51,810	10	,,	7	Do. B 7 p.c.	16¾–17	..	4 2 4
53,200	10	,,	6	Brentford Consolidated	15⅝–15⅞	..	3 15 7
380,000	Stk.	,,	12½	Do. New	250–252	..	4 19 2
300,000	,,	,,	9½	Do. 5 p.c. Pref.	189–191	..	4 19 6
50,000	,,	,,	5	Do. 4 p.c. Deb.	122–124	..	4 0 8
206,250	,,	Dec. 11	4	Brighton & Hove Orig.	101–103	..	3 17 8
220,000	Stk	Mar. 12	10⅝	Do. A Ord. Stk.	212–214	..	5 0 6
246,320	,,	,,	7½	Do.	154–156	..	4 19 4
467,000	21	Apl. 16	10	British	42½–43¼	..	4 12 6
109,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	118–120	..	5 0 0
165,700	,,	,,	4½	Do. do. 3½ p.c.	88–91	..	4 18 11
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13½–14	..	5 0 0
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4⅞–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5½–6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 5
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77–79	..	5 13 11
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅗	Commercial 4 p.c. Stk.	108–110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	102–104	..	4 16 2
475,000	..	Dec. 11	3	Do. 3 p.c. Deb. Stk.	82–84	..	3 11 5
800,000	Stk.	,,	5†	Continental Union, Ltd.	99–101	–1	4 19 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	139–141	..	4 19 3
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
143,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	97–99	..	5 1 0
486,090	10	Jan. 28	12	European, Ltd.	24–24½	..	4 18 0
354,060	70	,,	12	Do. £7 10s. paid.	18–18½	..	4 17 4
15,161,545	Stk.	Feb. 11	4/10/8	Gas 4 p.c. Ord.	103½–104½	..	4 6 6
2,630,000	,,	,,	3⅜	light and Coke 3½ p.c. max.	88–89	..	3 18 8
3,799,735	,,	,,	4	4 p.c. Con. Pref.	105–107	..	3 14 9
4,193,975	..	Dec. 11	3	3 p.c. Con. Deb.	86–87	..	3 9 0
258,740	Stk.	Mar. 12	4⅔	Hastings & St. L. 3½ p.c.	93–95	..	5 0 0
82,500	,,	,,	6¾	Do. do. 5 p.c.	118–120	..	5 4 2
70,000	10	Apl 29	11	Hongkong & China, Ltd.	17½–18	..	6 2 3
123,500	Stk.	Mar. 12	6½	Ilford "A" and "C"	138–140	..	4 12 10
65,780	,,	,,	5	Do. "B"	105–107	..	4 13 6
63,000	,,	Dec. 30	4	Do. 4 p.c. Deb.	102–104	..	3 16 11
4,940,000	Stk.	May 13	8	Imperial Continental	179–181	–1	4 8 5
473,600	Stk.	Feb. 11	3⅛	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
195,242	Stk.	Mar. 12	0	Lea Bridge Ord. 5 p.c.	120–122	..	4 18 4
501,000	Stk.	Feb. 25	10	Liverpool United A.	225–227	..	4 8 1
718,100	,,	,,	7	Do. B	168–170	..	4 2 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.	105–107	..	3 14 9
75,000	5	Dec. 11	6	Malta & Mediterranean.	4⅜–5	..	6 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4⅓	Melbourne 4½ p.c. Deb.	101–103	..	4 7 5
541,920	20	May 27	3⅜	Monte Video, Ltd.	12⅞–12⅞*	..	5 8 9
1,775,892	Stk.	Feb. 25	4¼	Newc'tle & G'tesh'd Con.	106¼–107½	..	4 3 9
518,795	Stk.	Dec. 30	3⅜	Do. 3½ p.c. Deb.	91–93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	198–20	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	13–13⅓	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	137–139	..	5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.	6–6⅓	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	137–139	..	4 19 0
60,000	50	,,	13	Do. B.	129–131	..	4 19 3
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	101–103	..	4 17 1
398,490	5	May 13	7	Primitiva Ord.	6⅜–7	..	5 0 0
796,580	5	Jan. 28	5	Do. 5 p.c Pref.	5¼–5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	94–96*	..	4 3 4
1,500,000	10	Apl. 29	8	River Plate Ord.	14⅜–15½	+¼	5 4 11
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd.	13⅜–14⅜	..	5 12 3
62,500	10	,,	—	Do. 6 p.c. Pref.	11½–12	..	5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50½–51½	..	4 17 1
135,000	Stk.	Mar. 12	10	Sheffield A	236–258	..	4 4 0
209,984	,,	,,	10	Do. B	233–255	..	4 5 1
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	Oct. 29	10	South African	14–14½	..	6 17 11
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	123–125	..	4 5 4
1,895,445	,,	Jan 14	3	Do. 3 p.c. Deb.	85–86	..	3 9 9
209,820	Stk.	Mar. 12	8	South Shields Co's. Stk.	152–154	..	5 3 11
605,000	Stk.	Feb. 25	5⅓	S'th Suburb'n Ord. 5 p.c.	120–122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124–126	..	3 19 4
502,310	Stk.	May 13	5	Southampton Ord.	110–112	+3	4 9 3
120,000	Stk.	Feb. 25	6⅔	Tottenham A 5 p.c. and B 3½ p.c.	132–134	..	5 0 9
423,940	,,	,,	5⅓		111–113	..	4 12 11
149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	101–103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	8⅞–9⅛	..	8 13 0
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.	101–103	..	4 17 1
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105–107	..	4 13 6
255,626	Stk.	Feb. 25	6⅓	Wands- B 3½ p.c.	133–141	..	4 12 2
79,416	,,	Dec. 30	3	worth 3 p.c. Deb. Stk.	73–75	..	4 1 1
895,872	,,	Feb. 25	5⅓	West Ham 5 p.c. Ord.	121–123	..	4 5 4
210,000	,,	,,	5	Do. 5 p.c. Pref.	125–127	..	3 18 9
253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	107–109	..	3 13 5

† Next dividend will be at this rate. Prices marked * are "Ex div."

A representative of the "Eastbourne Chronicle" who has visited the West Kent yeomanry camp there says, in describing his visit, a distinct innovation is seen this year in the provision made for artificial illumination. The Eastbourne Gas Company have been invited to lay on a supply of gas, by means of which the camp will be lit as effectively as a well-planned modern barracks. At the entrance a fine 1000-candle power lamp has been erected; and the canteen has been brilliantly lit with a number of "Graetzin" inverted lamps, each of 300 candle power. Near by is another marquee to be used by the troopers as a recreation tent, which is lit with four "Humphrey" lamps yielding an aggregate illumination of nearly 1500 candles. In the four large dining marquees are clusters of inverted burners hanging from the ridgepoles, and yielding most efficient light. The sergeants' mess and recreation tent is most brilliantly lit with incandescent burners, as also are a number of other smaller tents used as stores, &c. In the officers' quarters, the Company have secured a very beautiful effect by the use of many pretty coloured globes, in which are inverted incandescent burners; while other smaller tents are similarly illuminated. This is the first occasion, the correspondent thinks, that an attempt has been made to light a large camp in this manner. The Gas Company will render valuable assistance in cooking a considerable proportion of the food for this large aggregation of members of the territorial forces.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 157a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE

For GAS PURIFICATION.

LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD., PALMERSTON HOUSE, OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON 182 Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

LUX'S GAS PURIFYING MASS.

See Advertisement on p. 615.

FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

BROTHERTON & CO., LIMITED.

Offices: City Chambers, LEEDS.

Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

APPLY TO THE

CHAIN BELT ENGINEERING CO.

DERBY, ENGLAND,

FOR REALLY HIGH-CLASS

ELEVATORS AND CONVEYORS

ALSO

DRIVING AND CONVEYOR CHAINS.

TAR WANTED.

National Telephone 7002. Telegrams: "UPRIGHT."

Apply, THOMAS HORROCKS

Albert Chemical Works, BRADFORD, MANCHESTER.

Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

AMMONIACAL Liquor wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

"NUGEPE" GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,

LOWER MOSS LANE, MANCHESTER, S.W.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E. WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: 615 Oldham, and 2412 Hop, London.

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"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

OXIDE OF IRON (BOG ORE).

ANY QUANTITY. ANY PORT. ANY STATION.

DONALD M'INTOSH,

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SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd., NYMEGEN, HOLLAND.

General Manager (for England and Wales)—

CHARLES E. FRY, LEAMINGTON,

General Manager (for Scotland)—

J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

GAS OILS.

MEADE-KING, ROBINSON, & CO.

Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.

See Illustrated Advertisement June 1, p. 559.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by

CHANCE AND HUNT, LIMITED,

Works: OLDBURY, WEDNESBURY, AND STAFFORD.

Address Correspondence and Inquiries to OLDBURY, WORCS.

Telegrams: "CHEMICALS, OLDBURY."

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.

It is also used for the enrichment of Gas.

Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.

Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

OXIDE OF IRON.

(NATURAL.)

SPENT OXIDE PURCHASED.

BALE'S FIRE CEMENT.

PAINT FOR GAS-WORKS.

BALE & CHURCH,

5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD.,

with which is amalgamated WM. PEARCE & SONS, LTD. 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."

Telephone: 341 AVENUE.

"HALLITE" Asbestos High-Pressure Sheeting.

HALLITE DOUGLAS, LIMITED, 106, Leadenhall Street, LONDON, E.C.

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Please Address Inquiries for Analysis and Prices to the

NEW WESTBURY IRON COMPANY, LTD.

WESTBURY, WILTS.

FIDDES-ALDRIDGE

SIMULTANEOUS Discharging-Charger.

The one Machine which Discharges and Charges at One Stroke.

See Advertisement, May 4, p. II. of Centre.

ALDRIDGE AND RANKEN,

39, VICTORIA STREET, WESTMINSTER, S.W.

Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

KRAMERS AND AARTS WATER-GAS PLANT.

K. & A. WATER-GAS COMPANY, LTD.

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GAS TAR wanted,

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

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MOVEMENTS FOR CLOCKS, PHOTOMETERS AND BAROGRAPHS, WHEELS, PINIONS AND WORMS.

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HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: Saturators, Bolton. Telephone 0848.

D. ANDERSON AND COMPANY, GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "Dacolight London." Telephone: 2336 Holborn.

KINGS Patent Agency, Limited, 165, Queen Victoria Street, London, E.C. Director Benj. T. King, A.I.M.E., British Chartered Patent Agent (Regd. by Exam.). Telep. 682 Central. Teleg. "Geologic," London. We sustain over quarter of a century's Experience and Reputation for Patenting Inventions and Registering Trade Marks throughout the World.
Write or call. We attend and advise you free.

DESSAU PATENT VERTICAL RETORTS.
FOR list of Installations, see "Journal," May 18, p. I. of Centre.
THE DESSAU VERTICAL RETORT COMPANY,
Care of Mr. Charles Hunt, Consulting Engineer,
17, Victoria Street, Westminster, S.W.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. Wilson, Pleasant Grove, York Road, King's Cross, London, N.

AMMONIACAL Liquor wanted.
Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.
Telegrams: "Chemicals."

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 28, College Hill, London, E.C., and 25, Bridge End, Leeds.

AMMONIA.
Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHATE Leadwork, Repairs, Alterations, New Saturators by a Journeyman PLUMBER of Great Experience. Worked at Beckton, Sheffield, Dublin, &c. Work Guaranteed and at lowest possible Prices. Own Plant. Any Distance for Odd Work. Day or Contract. Leadburner.
117, Galloway Road, Shepherd's Bush, London.

CITY AND GUILDS EXAMS., 1910.
FULL Courses now starting in Gas En- gineering and Gas Supply; also courses for Matric., Inter., and Final B.Sc. (Engineering), Student and Assoc.M.Inst.C.E., Chemistry, Drawing, Building Construction, Practical Mathematics, Steam, Mechanics, &c.
Correspondence College Co., Dept. B., 26, Green Street, Cambridge.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices.
St. Paul's Cray, Kent.

GAS Engineers attending the Meetings of the Institution of Gas Engineers are cordially INVITED TO VISIT us at 49, 50, and 51, Wool Exchange, Coleman Street, E.C. We can show you the TWIN-LIGHT BURNER, which, on low pressure, puts up Lighting Values at least 50 per Cent. This is no idle boast.

THE Institution OF Gas Engineers.

THE ANNUAL GENERAL MEETING

WILL BE HELD ON

TUESDAY, JUNE 15 (10.30 a.m.)
WEDNESDAY, JUNE 16 (10 a.m.),
AND
THURSDAY, JUNE 17 (10 a.m.),
AT THE
INSTITUTION OF MECHANICAL ENGINEERS,
STOREY'S GATE, ST. JAMES' PARK, WESTMINSTER,
By kind permission of the Council.

The Chair will be taken by the President,
THOMAS GLOVER, Esq.

In connection with the Meeting an Excursion to Norwich, will take place on the Friday, June 18.
Full Particulars are announced in the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Contributors to the Benevolent Fund will be held at the Institution of Mechanical Engineers on Wednesday, the 16th of June, at 10 a.m.

WALTER T. DUNN, Secretary.
39, *Victoria Street, Westminster, S.W.*,
May 24, 1909.

SUTTON GAS COMPANY.
APPOINTMENT of Show-Room Sales- man. Candidates who sent in Applications are THANKED for the Same, and are Informed that the VACANCY HAS BEEN FILLED.

DRAUGHTSMEN wanted experienced in Gas-Works Plant, Coal and Coke Plants, &c.
Apply to W. J. Jenkins and Co., Limited, Retford.

SUBURBAN Gas Company requires a Young DRAUGHTSMAN, and a Young CHEMIST.
Apply, by letter, stating Age, Experience, and Salary required, endorsed "Draughtsman" or "Chemist," to No. 5103, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED—Clerk for Gas-Works in Durham (25-Million make), to work under Manager. Must have had Training in Gas-Works' Office and Competent to Keep Books.
Apply, in own handwriting, stating Age, Qualifications, and Salary required, to Messrs. Schultz, Comins, and Co., 50, Cannon Street, London, E.C.

THE Preston Gas Company require the Services of a Young WORKS CHEMIST. Salary, £80 per Annum.
Applications, with *copies* of Testimonials, to be received by the undersigned not later than June 14.
Samuel Tagg,
Engineer

WANTED, a Smart, Intelligent Young Man as IMPROVER to GAS-FITTING. One trained on Gas-Works preferred. He would be employed at present principally on Prepayment Fitting, Stove Repairs, and Cleaning. Wages 24s. per Week (57½ hours). To an intelligent Lad position would Improve.
Apply, by letter, to the Manager, Gas-Works, Dorking.

LIVESEY Washer Wanted, Modern make, 10-inch Connections, to effectively deal with 250,000 to 300,000 Cubic Feet per day.
State Price to No. 5098, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

PROCESS for the Manufacture of Self- Igniting Incandescent Mantles TO BE SOLD in England to One Firm only. Great success in other Countries.
Address 37, Holtwhites Hill, Enfield, Middlesex.

FOR SALE—Three Purifiers, by Newton, Chambers, and Co., 20 ft. square by 5 ft. deep, Planed Joints, 18-inch Valves and Connections, with Bye-Passes, Travelling and Lifting Gear. In Good Condition. Being Removed for Extension.
Apply to the Secretary, Gas Office, Sutton, Surrey.

FOR SALE, Cheap, the undermentioned GAS PLANT:—
Kirkham's "STANDARD" WASHER-SCRUBBER to pass 250,000 cubic Feet per diem.
GASHOLDER, 3-Lift, 50 ft. dia., cap. 128,000 c.f.
EXHAUSTERS, 10,000 and 8000 cub. ft. per Hour.
4-inch Cast-Iron Vertical CONDENSER.
Wrought-Iron SCRUBBER, 9 ft. high by 3 ft.
Donkin's VALVES, 12-inch, 10-inch, 6-inch.
Apply to Samuel While and Son, 60, Queen Victoria Street, London, E.C.

ADVERTISER has to Offer, for Im- mediate Delivery by Railway Trucks, in Large or Small Quantities, Fine Material from a large English Iron-Works, containing from 45 per cent. to 60 per cent. FERRIC OXIDE, and should be Useful for Gas Purification Purposes. Free Sample sent on Application.
Address No. 5102, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

DRAYCOTT GAS COMPANY.
FOR SALE—The Dismantled Plant at the Castle Donington (near Derby) Gas-Works, viz.: ASCENSION PIPES, ARCH PIPES, MOUTHPIECES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, CENTRE VALVE, STATION GOVERNOR, EXHAUSTER, and CART WEIGHBRIDGE.
Also at Draycott Gas-Works, FOR SALE (but still in use) FOUR PURIFIERS (nearly new), GAS-ENGINE, EXHAUSTER, &c.
For further Particulars and to view, Apply to the Managers at the respective Works.

THE Coventry Corporation Gas Depart- ment have FOR SALE about 170 WESTERN GAS-COOKERS, made by the Davis Gas Stove Company. These are excellent Gas-Cookers for Slot Consumers and are only offered for Sale because of being replaced by larger Cookers. They have been thoroughly Repaired, Cleaned, and Renovated, and supplied with New Grill Pans and Grids.
Price 12s. each, f.o.r. Coventry.
Fletcher W. Stevenson,
Engineer and General Manager.
Gas-Works, Coventry,
April, 1909.

KEIGHLEY CORPORATION GAS-WORKS.
THE Gas Committee invite Tenders for the Supply of the following Materials required during the Twelve Months commencing on the 1st of July next:—
CAST-IRON PIPES AND OTHER CASTINGS.
B. O. VITRIOL.
LIME.
Also for the Purchase of SPENT OXIDE during the same period.
Particulars and Form of Tender can be obtained on Application.
Tenders to be sent in on or before the 14th inst.
John Laycock,
Engineer.
Gas Offices, Cook Lane,
Keighley, June 1, 1909.

SPALDING URBAN DISTRICT COUNCIL.
(Gas Department.)
THE above Council invite Tenders for the Supply during the period ending June 30, 1910, of any Quantity not exceeding 5000 Tons of GAS COAL or NUTS, delivered f.o.b. Tyne, Keadby, Goole, or Pit, or by Rail at Spalding Station.
Forms of Tender and other Information can be obtained on Application to Mr. H. R. Wimhurst, Engineer and Manager, Gas-Works, Spalding.
Tenders, on the prescribed Form, sealed and endorsed "Gas Coal," must be received by me the undersigned on or before the 17th of June, 1909.
The Council do not bind themselves to accept the lowest or any Tender.
H. H. Harvey,
Clerk to the Council.
Council Offices, Spalding,
June 4, 1909.

COAL WANTED.
THE Urban District Council of Bangor (Co. Down) invite TENDERS for Supplying about 3000 Tons of Best Screened COAL, to be delivered and Trimmed into Coal-Store at the Gas-Works, Bangor, at such times and in such Quantities, of about 250 Tons, as may be required from the 1st of July next.
Deliveries of Coal into the Works will only be received between the hours of Six a.m. and Eleven p.m.
Persons tendering to name the Pit from which the Coal offered is raised.
Tenders should be accompanied by Analyses, placed in sealed envelopes, marked "Tender for Coal," and must reach me not later than Monday, the 21st of June, 1909.
No Tender Forms issued.
Any further Particulars required can be had from Mr. Barker Mitchell, the Gas Manager.
The Council do not bind themselves to accept the lowest or any Tender, and will require security for the due and faithful performance of the Contract.
By order,
J. Milliken,
Clerk to the Council.
Town Hall, Bangor, Co. Down,
June 2, 1909.

SKIPTON URBAN DISTRICT COUNCIL.
TENDERS FOR GAS COAL.
THE Council invite Tenders for the Supply of about 8000 Tons of Best GAS COAL, Screened, Unscreened, and NUTS, to be delivered free into the Council's Boats at the Pit Wharf, or at the Railway Station, Skipton, or at the Council's Wharf adjoining the Gas-Works in Skipton, on the Leeds and Liverpool Canal, between June 30, 1909, and July 1, 1910, in Monthly Quantities.
Full Particulars as to Periods and Quantities of Deliveries, &c., and Form of Tender, may be obtained from the Manager, Mr. J. H. Woodward, Gas-Works, Skipton, and Tenders, endorsed "Gas Coal," are to be sent to him on or before June 14, 1909.
TAR.
The Council also invite TENDERS for the Purchase and Removal of the Surplus TAR produced at the Skipton Gas-Works between the 30th of June, 1909, and the 1st of July, 1910.
Tenders, endorsed "Tar," are to be sent in on or before the 14th of June, 1909.
The lowest or any Tender not necessarily accepted.
Richard Wilson.
Clerk to the Council.

THE Urban District Council of Atherton invite TENDERS for the Supply of about 7000 Tons of Screened GAS COAL or NUTS from the 1st of July, 1909, to the 30th of June, 1910.

Forms of Tender and further Information may be had from the undersigned, to whom Tenders should be delivered on or before Wednesday, June 16 inst.

W. GARNETT,
Clerk.

June 2, 1909.

BOROUGH OF NEWCASTLE-UNDER-LYME.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply and Delivery of 9000 Tons of GAS FUEL during the Twelve Months ending June 30, 1910.

Forms of Tender may be had from the undersigned.

Tenders to be sent to the Town Clerk on or before June 14, 1909.

The Committee do not bind themselves to accept any Tender.

E. P. BASKEYFIELD,
Manager and Secretary.

Newcastle, Staffordshire,
May 22, 1909.

NEWCASTLE-UNDER-LYME CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of this Corporation are prepared to receive TENDERS for the Purchase of their Surplus TAR and AMMONIACAL LIQUOR produced at these works for Twelve Months ending June 30, 1910.

Tenders, endorsed "Tar and Liquor," to be sent to the Town Clerk on or before June 14, 1909.

The Gas Committee do not bind themselves to accept the highest or any Tender.

The Tar and Liquor to be taken in Boats.

E. P. BASKEYFIELD,
Manager and Secretary.

Newcastle, Staffordshire,
May 22, 1909.

DUNDEE GAS COMMISSIONERS.
(DUNDEE CORPORATION.)

THE Dundee Gas Commissioners are prepared to receive TENDERS for the Supply and Delivery of 500 Tons of BOG ORE or OXIDE OF IRON for Gas Purification purposes.

Copy of Specification and Form of Tender may be obtained from the Subscriber.

Sealed Tenders, endorsed "Oxide of Iron," to be lodged with Wm. H. Blyth Martin, Esq., Town Clerk, City Chambers, Dundee, not later than Saturday, the 12th of June.

The Commissioners do not bind themselves to accept the lowest or any Offer.

ALEX. YUILL,
Engineer and Manager.

Engineer's Office, Gas-Works,
Dundee, June 1, 1909.

BOROUGH OF DARWEN.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the Supply of the following Goods for One Year:

WROUGHT-IRON TUBES AND FITTINGS.
CAST-IRON MAINS AND SPECIALS.
BRASS FITTINGS.

Full Particulars and Forms of Tender may be obtained on Application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed and endorsed Tenders, must be delivered to me the undersigned not later than Saturday, June 26, 1909.

The lowest or any Tender not necessarily accepted.

By order,
WM. P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
June 3, 1909.

BOROUGH OF DARWEN.

TENDERS FOR TAR.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for all the Surplus TAR produced at their Gas-Works for One Year.

Further Particulars and Forms of Tender may be obtained on Application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed Tenders, endorsed "Tender for Tar," must be delivered to me the undersigned not later than Saturday, the 26th day of June, 1909.

The highest or any Tender not necessarily accepted.

By order,
WM. P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
June 3, 1909.

READING GAS COMPANY.

TENDERS FOR TAR.

THE Directors of the Reading Gas Company invite TENDERS for the Purchase of their Surplus CARBURETTED WATER-GAS TAR, for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on Application to the Engineer and Manager, Mr. Douglas H. Helps, Assoc.M.Inst.C.E.

Under the Conditions of the Contract, an allowance will be made for all Water that may be found in the Tar in excess of 5 per cent.

Railway and River Communication direct to the Works.

Tenders, endorsed "Tender for Tar," and addressed to the undersigned, must be delivered not later than Monday, the 21st inst.

The Directors do not bind themselves to accept the highest or any Tender.

A. CANNING WILLIAMS,
Secretary.

159, Friar Street, Reading,
June 2, 1909.

COUNTY BOROUGH OF ROTHERHAM.

THE Gas Committee invite Tenders for the Supply of 24,000 Tons of Screened COAL, PEA, and Large NUTS, up to June 30, 1910.

Tenders to be sent to the undersigned not later than June 22 next, endorsed "Tender for Gas Coal."

Forms of Tender and Particulars can be obtained from Mr. J. S. Naylor, Gas Engineer.

Firms whose Tenders are accepted will be required to enter into Contracts which will contain the Fair-Contract Clause.

The Committee do not bind themselves to accept the lowest or any Tender.

W. J. BOARD,
Town Clerk.

Town Hall, Rotherham,
May 29, 1909.

COUNTY BOROUGH OF ROTHERHAM.

THE Corporation of Rotherham are prepared to receive OFFERS for the Purchase of the Surplus GAS TAR and AMMONIACAL LIQUOR produced at their Gas-Works during the ensuing Year.

Forms of Tender and Specification may be obtained on Application to Mr. J. S. Naylor, Gas Engineer.

Offers, endorsed "Gas Tar and Ammoniacal Liquor," to be sent to me not later than June 22 next.

W. J. BOARD,
Town Clerk.

Town Hall, Rotherham,
May 29, 1909.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the Supply of not exceeding 6000 Tons of Screened GAS COAL or GAS NUTS, for use at the Gas-Works, Beverley, for a period of Twelve Months, to be delivered as from time to time directed, and at the expense of the Contractors, f.o.b. at Keadby or at the Pits, or at the Railway Station, Beverley, according to Terms of Contract. The Coal to be of the best kind, well Screened, free from Bats, Bind, Refuse, and Dirt, and to be weighed 20 cwt. to the Ton, upon the Corporation machine. The Seam from which the Coal is raised to be stated.

Payments will be made from time to time so long as the Contractors shall duly fulfil the Contract.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract as they think fit.

Further Information and Forms of Tender may be obtained of the Gas Manager, Mr. F. W. Oldfield, at the Gas-Works, Beverley, and Tenders, endorsed "Tender for Coals," must be delivered at my office not later than Ten a.m. on Thursday, the 24th day of June, 1909.

J. WILLIS MILLS,
Town Clerk.

Town Clerk's Office,
31, Lairgate, Beverley,
June 3, 1909.

This notice is not issued for the purpose of inviting subscriptions for Shares, but by way of information only, and no Applications will be entertained unless the same are made on the footing of and with reference to the full Prospectus.

The Subscription List will open on Thursday, the 10th day of June, 1909, and close on or before Wednesday, the 16th day of June, 1909.

Applications will be received by, and the full Prospectus and Forms of Application can be obtained at, Williams Deacons Bank Limited, Manchester, and any of its Branches, and from the Company's Solicitors, Auditors, or Engineers.

There are no Founders' Shares. No Promotion Money has been or will be paid.

THE RAINFORD GAS COMPANY, LTD.

(Incorporated under The Companies Acts, 1862 to 1907.)

CAPITAL - £8000 divided into 800 Shares of £10 each, which are now offered for Subscription at par.

The Shares are payable as follows:

£1 per Share on Application; £4 per Share on Allotment; £2 10s. per Share One Month after Allotment; and the balance of £2 10s. per Share as and when required, at not less than One Month's notice.

Directors:

EDWARD HENTHORNE, "Norwood," Poulton le-Fylde, Merchant.
JAMES LONGTON BOLTON, "Dial House," Rainford, Manager.
WILLIAM KAY, "Standish House," Stretford, Manchester, Engineer.

Bankers:

WILLIAMS DEACONS BANK LIMITED, St. Ann's Street Branch, Manchester.

Solicitors: DOUGHTY & FRASER, 17, Market Street, Manchester.

Auditors:

BOWMAN & GRIMSHAW, 26, Birley Street, Blackpool, Chartered Accountants.

Engineers: BRIERLEY, HOLT, & CO., Richmond Terrace, Blackburn.

Secretary and Registered Offices (pro tem.):

CHRISTOPHER CHRYSTAL, 17, Market Street, Manchester.

This Company has been formed for the purpose of acquiring The Rainford Gas Order, 1908 (as confirmed by the Gas Orders Confirmation Act, 1908), which is an Order authorizing the construction and maintenance of Gas-Works and the Supply of Gas in the Parish and Urban District of Rainford, in the County Palatine of Lancaster, and for other purposes, and pursuant to such order TO CONSTRUCT AND MAINTAIN GAS-WORKS FOR THE SUPPLY OF GAS TO RAINFORD ACCORDINGLY.

The Parish and Urban District of Rainford comprises some 3500 inhabitants. There is no Public System of Lighting in the District.

There are, in the Area of Supply, the Parish Church of All Saints; the Roman Catholic Chapel and Presbytery; the Congregational Church; the Primitive Methodist Chapel; the Schools attached to these places of Worship; the new Rainford Urban District Council Offices, Reading and Recreation Rooms; the L. & N. W. and L. & Y. Railway Stations.

The Directors intend to provide and fix Services, Cookers, and Fittings. It is also intended to make provision for those Consumers who desire to take their Supply through Prepayment or Slot Meters.

The Plot of Land forming the Site of the proposed Gas-Works adjoins the London and North Western Railway (Rainford Junction to St. Helens). It is freehold, and centrally situated for convenient distribution, and provides ample space, not only for the erection of the proposed Works, but for future extensions.

The Vendors have Contracted to Purchase this Plot of Land, together with One Half of the Siding, Points, Crossings and Workings as at present existing, and extending from the St. Helens Branch of the L. & N. W. Railway to and on to the Land referred to, for the sum of £1045 (*plus* Vendors' costs), which will be paid for in cash out of the proceeds of this issue. This Siding will be of considerable importance in economically dealing with Coal and Residuals.

It is estimated that the cost of constructing the proposed Gas-Works Plant, and the laying of the Mains will amount to £5300. The Supply and Erection of the Gas-Producing Plant has been entrusted to Messrs. Newton, Chambers, and Co., Ltd., Thorncliffe Iron Works, Sheffield.

It is anticipated that the necessary works will take some Six Months to complete, and such works will be able to produce a minimum of 8,000,000 cubic feet of Gas per Annum, with Plant to deal with double this quantity.

The Remunerative Nature of similar Gas Undertakings is shown by the following, extracted from *The Gas Works Directory and Statistics, 1908-9.*

Name of Town.	Population Supplied	Share Capital paid up	Loan Capital.	Dividend.	Interest on Loan.
Bolsover, Derbyshire	3,748	£12,000	£1,250	13%, 10%, & 10%	4%
Burton-Latimer, Northants.	3,500	£5,100	£1,000	8½%	4%
Chepstow, Mon.	4,500	£7,000	£1,750	5%	3½% & 4%
Connahs Quay, Flint	4,000	£7,770	£3,400	8%	4%
Dronfield, Derbyshire	4,000	£13,800	Nil	5½%	—
Hollingworth, Cheshire	3,500	£4,792	£1,100	7½% & 5½%	4%
Huyton & Roby, Lancs.	5,500	£19,575	£1,800	10% & 7%	3½% & 4%
Oakham, Rutland	3,900	£11,600	£2,900	5% Pref. 10% Original Shares 7% New Ordinary	4%
Ormskirk	6,298	£25,836	£2,000	10% & 7%	3½% & 4%
Prescot, Lancs.	10,000	£23,588	£5,100	9%, 7%, 5%, 4½%, & 4%	4% & 3½%

It is to be noted that by the Rainford Gas Order, 1908, above mentioned, there shall not be declared or made in any One Year out of the Profits of the Company, any larger dividend than £10 in respect of every £100 actually paid up of the Capital, unless a larger Dividend be at any time necessary to make up the Deficiency of any previous Dividend which shall have fallen short of the said Yearly rate.

Attention is called to the fact that the Vendors do not make any Profit out of the Sale, as by Section 6 of the Rainford Gas Order, 1908, it is provided that the consideration payable by the Company to the Vendors or their Executors, Administrators, or Assigns for the Transfer of the Undertaking, shall not exceed the aggregate amount of the Costs, Charges, and Expenses preliminary to, and of and incidental to the Applying for, Preparing, and Confirming the said Order, and otherwise in relation thereto. Such Costs, Charges, and Expenses have been taxed by the Board of Trade at £998 6s. 11d.; and the Board of Trade has assented to the Transfer to the Company and has fixed the consideration payable in respect thereof at £1000, which will be paid by this Company in cash, or Shares, at the option of the Vendors.

A Commission of 2½ per cent. will be paid to Brokers on all Allotments upon Applications bearing their stamp.

The full Prospectus contains Particulars of Contracts and other Information to satisfy the requirements of the Companies (Consolidation) Act, 1908.

Copies of the above-mentioned Rainford Gas Order, 1908, Agreements, Memorandum, and Articles of Association may be inspected at the Offices of the Company's Solicitors, between the hours of 10 a.m. and 4 p.m. (Saturdays 10 to 12) while the Subscription List is open.

Applications for Shares should be made on the proper Form and forwarded, with a Cheque for the amount payable on Application, to the Company's Bankers. If no Allotment is made, the deposit will be returned in full. Where a less number of Shares is allotted than is applied for, the Surplus paid on Application will be credited in reduction of the amount to be paid on Allotment. Should default be made in payment of the amount of any instalment when due, the amount previously paid will be liable to forfeiture.

NORTHWICH GAS COMPANY.

THE Directors of the Northwich Gas Company invite TENDERS for the Supply of about 7000 Tons of GAS COAL during the Year ending June 30, 1910.

Full Particulars and printed Form of Tender may be had on Application to the undersigned.

Tenders, endorsed "Coal," are to be sent in addressed to the Chairman, by Thursday, June 10, 1909.

SAM. S. MELLOR,
Manager and Secretary.

Gas-Works, Northwich.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee invite TENDERS for the Surplus TAR to be produced at their different Gas Stations for a period of One Year, commencing the 1st of July next.

The Yearly make of Tar is about 8000 Tons.

Particulars and Forms of Tender can be obtained on Application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, June 22, 1909.

J. H. HALLSWORTH,
Town Clerk.

Oldham, June 3, 1909.

HINDLEY URBAN DISTRICT COUNCIL.

THE Gas Committee invite Tenders for the Supply of, Delivered at their Gas-Works, about 8000 Tons of Best Screened Arley GAS NUTS, ENGINE SLACK, and LIME, for the Twelve Months ending June 30, 1910.

Particulars and Forms of Tender may be obtained from H. O. Timmins, Gas Engineer.

Tenders must be on the Council's Form, and must be delivered to the undersigned, endorsed "Gas Coal," on or before Monday, June 14, 1909.

The Committee reserve to themselves the right to accept the whole or any portion of any Quantity offered, and do not bind themselves to accept the lowest or any Tender.

THOS. ROBEY,
Clerk to the Council.

BOROUGH OF EVESHAM.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Evesham Corporation invite TENDERS for the Supply of from 1000 to 3000 Tons (or less if required) of Best Screened GAS COAL, during the Year ending the 30th day of June, 1910, to be delivered on rail at Evesham.

Tenders, to be marked "Tender for Gas Coal," to be sent to me not later than the 26th day of June inst., and to include full description as to Coal and price.

No Form of Tender supplied.

The Corporation do not bind themselves to accept the lowest or any Tender.

THOMAS A. COX,
Town Clerk.

Town Clerk's Office,
Evesham, June 2, 1909.

BOROUGH OF NEWBURY.

(GAS DEPARTMENT.)

THE Gas Committee of the Newbury Corporation invite TENDERS for the Supply of 5500 Tons of GAS COAL or NUTS, during the period of Twelve Months between July 1 next and the 30th of June, 1910, to be delivered free to Newbury Station on the Great Western Railway, in such Quantities as may be agreed.

Tenders, to be endorsed "Tenders for Coal," and addressed to the Chairman of the Gas Committee, Gas-Works, Newbury, and delivered not later than June 11 next.

The Committee do not bind themselves to accept the lowest or any Tender.

Form of Tender from the undersigned.

WM. RD. DAVEY,
Manager.

Gas-Works, Newbury,
May 29, 1909.

WHITEHAVEN HARBOUR.

TENDERS FOR LIGHTING.

THE Whitehaven Harbour Commis- sioners are prepared to receive TENDERS for LIGHTING the HARBOUR QUAYS, &c., by Electricity, Gas, or other means, for Five Years, or such other period as may be agreed upon, from the 1st of January, 1910.

Application must be made to the Harbour Master for Particulars.

Sealed Tenders, endorsed "Lighting," addressed to the undersigned, must be delivered not later than Ten a.m. on Tuesday, the 20th of July, 1909.

The Commissioners do not bind themselves to accept the lowest or any Tender.

JOHN TYSON,
Clerk.

Harbour Office, Whitehaven,
June 1, 1909.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR SURPLUS TAR.

THE Directors invite offers for the Surplus TAR made at their Brierley Hill and Kingswinford Works, to be taken between July 1 next and June 30, 1910, delivered into Buyer's Boats.

Quotations to be based on the rate of 200 Gallons to the Ton.

The Directors do not bind themselves to accept the highest or any Tender.

Sealed Tenders, to be addressed to the Chairman and endorsed "Tender for Surplus Tar," not later than June 26 next.

HENRY M. JACKSON,
Secretary.

Board Room, Gas-Works,
Brierley Hill, May 25, 1909.

COUNTY BOROUGH OF BURY.

THE Corporation of Bury are prepared to receive TENDERS for the Supply of about—

40,000 Tons of GAS COAL.
900 Tons of BOILER SLACK.
400 Tons of BURGY.
300 Tons of HOUSE COAL.

Forms of Tender and Conditions may be obtained on Application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders to be delivered to the Town Clerk, Bury, not later than Nine a.m. on Monday, June 14, 1909.

CITY OF HEREFORD.

(GAS DEPARTMENT.)

TENDERS FOR TAR.

TENDERS are invited for the Surplus TAR produced for the Twelve Months ending June 30, 1910.

Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Town Hall not later than the first post on the 21st inst.

W. W. TOWNSEND,
Engineer and Manager.

Gas-Works, Hereford,
June 1, 1909.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED from the 14th to the 21st of June, 1909, both days inclusive.

The Interest for the Half Year to June 30, 1909, will be payable on the 1st of July to the Proprietors Registered on the closing of the Books.

By order of the Board,
E. TOPLEY,
Secretary.

Chief Offices of the Company:
639, High Road, Tottenham,
June 3, 1909.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

GREAT YARMOUTH WATER-WORKS COMPANY.

NEW ISSUE OF £8000 NEW ORDINARY STOCK,
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, June 9, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 750 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, June 9, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, as above.

READING GAS COMPANY.

SALE BY TENDER OF FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

THE Directors of the Reading Gas Company invite TENDERS for:—

£5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK,

to be raised in Pursuance of the powers of "The Reading Gas Act, 1902."

Sealed Tenders, on the Form provided, must be delivered at the Company's Central Offices, 159, Friar Street, Reading, on or before Monday, the 14th of June, 1909.

The Stock will be allotted to the highest bidders, and will be Registered in the names of the Purchasers, or their Nominees, Free of Expense.

The Purchase Money for the Stock to be paid by the 30th of June, 1909.

The Debenture Stock ranks before the whole of the Company's Preference Shares and Ordinary Stock, and the interest on the same has priority of payment over the Dividends on the said Preference Shares and Ordinary Stock.

Particulars and Conditions of Sale and Forms of Tender may be obtained on Application to the undersigned.

By order of the Directors,
A. CANNING WILLIAMS,
Secretary.

159, Friar Street, Reading,
May 18, 1909.

COAL.

THE Salisbury Gas and Coke Company invite TENDERS for 1000 to 3000 Tons of GAS COAL delivered f.o.r. Salisbury as required over next Twelve Months.

Tenders (on Sender's Form) before June 12, addressed to Mr. N. H. HUMPHRYS, Gas-Works, SALISBURY.

To Close a Trust.

TO BE SOLD BY MR. H. SAVILE JOWETT, at the Old

Cock Hotel, Halifax, on Friday, the 18th day of June, at 7.20 o'clock in the Evening precisely.

FIVE DEBENTURE SHARES, OF £50 EACH, IN DRAKE'S, LIMITED.

1000 PREFERENCE SHARES, OF £1 EACH, IN DRAKE'S, LIMITED, FULLY PAID.

1000 ORDINARY SHARES, OF £1 EACH, IN DRAKE'S, LIMITED, FULLY PAID.

For further Particulars, Appiy to the AUCTIONEER, at his Offices, Warwick Chambers, Southgate, HALIFAX; and for Inspection of the Special Conditions of Sale to JOHN MITCHELL, Solicitor, 11, Fountain Street HALIFAX.

BOROUGH OF PORTSMOUTH WATER-WORKS COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT 20 & 21 VIC. CAP. XLV. (1857).

ISSUE OF £3 10s. PER CENT. PERPETUAL DEBENTURE STOCK AT PAR.
(This is an Authorized Trustee Investment Stock under the Trustee Act, 1893.)

NOTICE is Hereby Given, that the Directors of the above Company are prepared to receive APPLICATIONS for the above STOCK at par, being PERPETUAL DEBENTURE STOCK authorized under the Provisions of the Company's Acts of Parliament and Orders. The Stock will bear Interest on and from the date of payment of the money at the rate of £3 10s. per Centum per Annum, payable Half-Yearly in respect of the Six Months ending the 31st of March and the 30th of September in each Year.

Applications to be forwarded by post, addressed to the Secretary of the Company, on or before Tuesday the 15th day of June, 1909.

In the event of Allotment, the amount must be paid within One Month from the date of the Allotment Letter. If this provision is not complied with, the Allotment will be thereby cancelled.

The Directors will endeavour to deal with Applications in the order in which they are received, subject to an option of conversion to the holders of existing Mortgage Debenture Bonds. But the Directors do not bind themselves to accept any Offer; and it is further stipulated that the determination of the Board of Directors in all matters relating to the Offer, Allotment, Issue, or otherwise in respect of the above Stock, shall be final and binding on all parties. No amount of Stock less than £50 will be allotted, and the Stock will be transferable in multiples of £1 only.

No Offer will be considered unless made on a Form of Application which can be obtained from the Secretary.

By order of the Board of Directors,
J. L. WILKINSON,
Secretary to the Company.

Offices: Commercial Road,
Portsmouth, May 20, 1909.

AUTOMATIC STREET LIGHTING
MEANS
DR. ROSTIN'S APPARATUS.
Largest Installations in the World.
109, CANNON ST., E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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HEATHCOTE GAS COAL
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GRASSMOOR COLLIERIES,
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Rich in Illuminating Power and Yield of Gas
Above the Average in Weight and Quality of Coke.
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Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
Shipments Promptly and Carefully Executed.

London Office: H. Cresswell & Co., Leadenhall Chambers, 4, St. Mary Axe, E.C.

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Sperm Value 878·85 lbs. per Ton.
Please apply for Price, Analyses and Report, to the
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Owners of the Birtley Iron Works and Pelaw Main Collieries,
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For Pressure Scales in One Length up to 4 feet.
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Note.—Makers of HORSLEY SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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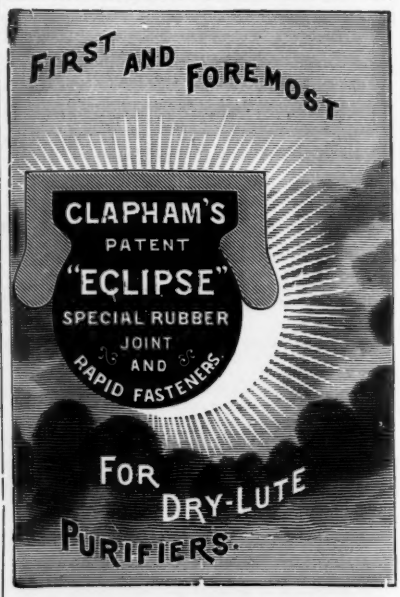

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Why Gas Companies should adopt the above Process:—
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CAST-IRON PIPES FOR GAS, WATER, & STEAM,
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ALLIANCE FOUNDRY, 147, MILTON STREET, GLASGOW,
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